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Preface

CITCS 2019 Aims to bring together the scientists, young and senior researchers to propose their ideas, contributions and to exchange and share their experiences and research results on all aspects of Innovative Trends in Computer Science. It also provides a premier platform for researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of Innovative Trends in Computer Science.

The event covers a diverse spectrum of research topics, such as:

- **Machine learning & Big Data**
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- **Security and Privacy**
- **Next Generation Networks**
- **Cloud computing & Networking**
- **Mobile computing**
- **Web Services & Technology**
- **E-learning & ICT in education**
- **Bioinformatics**
- **Optimization and operational research**

The program of first edition of CITCS 2019 includes both articles containing theoretical works as well as practical applications that often use various techniques from the different themes covered by this event. Each submitted article has been evaluated by at least two reviewers. The Program Committee selected Twenty-six articles for an oral presentation and nine articles for a poster with an acceptance rate of 40%.

We would like to thank all the authors who have shown interest in this event, the invited speakers who have not hesitated to make their contributions, the members of the program committee for their evaluation effort and the members of the organization committee for their availability.

November 18, 2019
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CITCS 2019 Conference Chair
Brahim Farou

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Oral Session

Job Migration for Load Balancing Algorithm in Grid Computing Using Queue Length parameter

Ali Wided
Department of Mathematics and Computer Science
University of tebessa
Tebessa, Algeria
wided.ali@univ-tebessa.dz
aliwided1984@gmail.com

Bouakkaz Fatima
Department of Mathematics and Computer Science
University of tebessa
Tebessa, Algeria
f.bouakkaz@univ-tebessa.dz
f_bouakkez@esi.dz

***Abstract*— based on the previous works, we used the job migration technique for hierarchical load balancing. In this paper the authors propose a novel job migration algorithm for dynamic load balancing (JMADLB), in which parameters(such as CPU queue length) have been considered which is used for the selection of overloaded resources (or underloaded ones) in grid. . In dynamic load balancing state, the system will change dynamically until it reaches a balance. In a grid environment, efficiency of resources varies with time. Thus, the allocation of jobs must be adjusted dynamically in according with the variation of the resources status. The proposed algorithm has been verified through Alea2 simulator and the simulation results validate that the proposed algorithm allow us to reach our objectives.**

Keywords— grid computing, load Balancing, job Migration, workload, information policy, location policy, selection policy, resources Allocation.component;

I. INTRODUCTION

A computational Grid is a hardware and software infrastructure that gives dependable, consistent, pervasive, and cheap access to high-end computational capabilities [1]. The challenges in grid computing lie in load balancing. Load balancing is an important issue for the problem of utilization. It is those techniques which are designed to equally distribute the load on resources and maximize their utilization. These techniques can be approximately categorized as centralized or decentralized, dynamic or static, periodic or non-periodic [2]. Main purpose of load balancing is to enhance the response time of the application by which workload would be saved according to resources. There are causes which are the major raisons of load balancing, resubmission of jobs and job migration; heterogeneity of resources, dynamic nature of resource's performance and diversity of applications in case of Grids[3]. This is even more vital in computational Grid where the main concern is to equally allocate jobs to resources and to minimize the difference between the overloaded and the underloaded resource load [4]. Efficient load balancing through the Grid is required for improving performance of the system. The overloaded grid resources can be balanced by migrating jobs to the idle processors, i.e. a set of processors to which a processor is directly connected [4]. Our contributions are: First, we proposed a hierarchical load balancing algorithm. Second, we verified the proposed algorithm through Alea 2 simulator. The objective of proposed algorithm is enhancing the performance of application by minimizing slowdown, and the waiting time in the global queue, maximizing the resources usage rate and load balancing among the resources.

II. RELATED WORKS

The authors[5] have suggested a Priority based Dynamic Load Balancing Algorithm (PBDLB). When a node is overloaded, it calls the MSN which then finds a suitable node and then performs the load balancing, a function msn ( ) finds the available under-loaded nodes by looking into a queue where all the processors are scheduled in the decreasing order of their computing power. here CPU queue length is considered. The Job Migration strategy is used through which the migration of jobs takes place from the heavily node to the lightly-loaded node. The advantage of this algorithm is that it takes into account the resource processing capability, where the nodes with high computing power have high priority; also it decreases the communication overhead and proves to be cost real. The drawback of this study is not considering the fault tolerance.

In the study of [6] an Augmented Hierarchical Load Balancing with Intelligence Algorithm is proposed (AHLBI). When a job request comes, the scheduler initializes job and cluster parameters comes, the scheduler initializes job parameters and calculates the Expected computing power, ECP for each job together with ALC, Average System Load and ACP of clusters before job allocation. The algorithm find the deviation of ALC with the Average system load and find out the probability value of deviation for every cluster. If the probability of deviation is within the range of 0 and 1, the cluster is marked as under loaded. The ACP of under loaded clusters is compared with the ECP of jobs. If the ACP value of a cluster is less than or equal to ECP of jobs, the cluster is considered as fittest and job is allocated to it. After job allocation to clusters, some clusters may remain underutilized. To avoid this, AHLBI compares the queue length of all the clusters. Jobs from clusters with large queue size are stolen and allocated to free clusters. Similarly, when the number of jobs waiting to be executed in a cluster's queue increases, jobs from queue tail is allocated to free clusters for execution. the advantages of this algorithm are reducing idle time of clusters and makespan. The drawback of this strategy is that it does not

A novel Arabic handwriting recognition system based on image matching technique

1st Maamar Kef
Department of Computer Sciences
Universit Mostefa Benboulaid - Batna 2
Batna, Algeria
lm_kef@yahoo.fr

2nd Leila Chergui
Department of Computer Sciences
Universit Mostefa Benboulaid - Batna 2
Batna, Algeria
pgleila@yahoo.fr

***Abstract*—This paper presents a new off-line recognition system for Arabic handwritten words. The proposed system uses scale-invariant descriptor namely SIFT, and based on an image matching technique for achieving classification. The recognition process was done through a Keypoints matching procedure, using a nearest-neighbor distance-ratio. The paper presents also a new large Arabic handwritten word database. This database provides a new framework for benchmarking and gives a new freely available Arabic handwritten word dataset. Several tests have been performed using our new database and the well known IFN/ENIT database for comparison purposes. A high correct recognition rate was reported.**

***Index Terms*—Arabic handwriting recognition, Features extraction, SIFT descriptors, Keypoints matching, New Arabic database.**

Automatic recognition of handwritten scripts is an area of pattern recognition that is extremely useful in numerous fields, including documentation analysis, mailing address interpretation, bank check processing and more recently the reconstruction and recognition of historical manuscripts.

Recognition of Arabic handwriting remains one of the most challenging problems in the pattern recognition domain. Arabic is written by more than 240 million people, in over 20 different countries. The standard Arabic script contains 28 letters. Each letter has either two or four different shapes, depending on it position within a word.

One of the most challenging aspects of off-line handwriting recognition is finding a good database that well represents the variety of handwriting styles. Comparing with the great number of existing databases for English script, IFN/ENIT database [1] was the only freely accessible Arabic database; this incited us to develop a new large database which will be freely available for research and academic use.

In this research we present a new fast and robust Arabic handwriting recognition system based on SIFT descriptor and a recognizing procedure that use keypoints matching. Contrary to the majority of handwritten characters recognition systems, the proposed method operates without any preprocessing steps, since the used features are invariant regarding images' transformations and are highly distinctive in a large database. We also introduce a new large database of Arabic handwritten words which provides a comparison tool for research works in characters recognition domain.

The remainder of this paper is divided into six sections. The next section resumes several works done in handwritten Arabic recognition field. Section 3 detail the feature extraction method and section 4 describes our new Arabic handwritten words database. Experimental results including keypoints detection and matching are reported in section 5, where a comparative analysis of the experimental results is also discussed. Finally, some concluding remarks end the paper.

I. Related works

The main idea of scale invariant feature descriptor (SIFT) [6] is resumed on detecting distinctive invariant features from images that can be later used to perform reliable matching between different views of an object or scene. Because of the proved efficiency of the SIFT keypoint detector, a large number of researcher are attracted further for expanding or using these descriptors in many applications. In handwritten recognition domain, SIFT was addressed in a few published papers.

Diem and Sablatnig [5] tried to solve the problem of degraded handwritten characters recognition using SIFT descriptors. In order to recognize a character, the local descriptors are initially classified with a Support Vector Machine (SVM) and then identified by a voting scheme of neighboring local descriptors.

De Campos [4] presented a solution to the problem of recognizing characters in images of natural scenes. Such situations could not be well handled by traditional OCR (Optical Character Recognition) techniques. The problem is addressed in an object categorization framework based on a bag-of-visual-words representation. For feature extraction, authors used SIFT and other descriptors.

Zhang et al. [13] proposed a novel SIFT based feature for off-line handwritten Chinese character recognition. The presented feature is a modification of SIFT descriptor taking into account of the characteristics of handwritten Chinese samples. MQDF classifier was used in classification phase and showed that the proposed method outperforms original SIFT feature and two traditional features, Gabor feature and gradient feature.

In [11] a new method for the off-line recognition of Tamil handwriting characters based on local feature extraction was

Latency and energy efficient routing-aware TDMA for Wireless Sensor Networks

Islam Amine Bouchedjera and Lemia Louail
LRSD laboratory, Faculty of Sciences, University Ferhat Abbas Sétif 1
Email: bouchedjera.islam@univ-setif.dz, lemia.louail@univ-setif.dz

***Abstract*—Minimizing energy consumption and aggregating data quickly are among the most important concerns of wireless sensor networks, because of the self-employment and the independent decisions of each layer in the protocol stack. An emerging design of the latter called the cross-layer concept that attempts to expand the interactions in the protocol stack between the protocols of different layers has shown an improvement in the overall performance of such networks.**
In this context, in order to achieve energy efficiency and fast data aggregation, and since the protocols of the MAC sub-layer and the network layer have a direct effect on these two metrics, we propose Efficient-Depth-ReLO, a centralized cross-layer approach between these two layers. This approach aims to build a TDMA scheduling by using the routing tree information. On the other hand, the proposed approach solves efficiently the hidden node problem. The results of extensive simulations show that the proposed approach performs better than similar existing work in terms of energy consumption and communication latency.

***Index Terms*—WSNs, Cross-Layer, TDMA, Routing tree, Hidden node problem, Energy consumption, Communication latency**

I. Introduction

The convergence of Micro-Electro-Mechanical Systems (MEMS) technology, wireless communications and digital electronics have led to the emergence of a new type of wireless networks, which connects the physical and digital environments, called Wireless Sensor Networks (WSN) [1]. This type of networks shares some important features with Ad-Hoc networks, such as self-organization, multi-hop communication, shared radio channel. Besides that, it raises new challenges because of the limited resources allocated to sensor nodes in terms of energy, capture and communication range, bandwidth, data processing and storage capacity. Moreover, the interconnection of WSNs with each other and with the Wide Area Networks (WANs) allowed the emergence of a new concept called the Internet of Things (IoT). The latter has been allowing the increase of the usefulness of these networks and consequently their importance in daily life [2].

Communicatons in this type of networks are ensured through a layered model, inspired from the Open Systems Interconnection (OSI) model. This model is based on the principle of layer separation, where the layers are implemented independently of each other, as each layer is responsible for providing particular functionalities and optimizing certain metrics. The individual decisions at each layer generate a data processing redundancy, and may sometimes result in conflicts between the goals of each layer. They thus lead to an additional cost in terms of energy consumption and a degradation of the QoS of the WSN [3]. Many papers [4], [5], [6] have shown that layers depend on each other and decisions of one affect the decisions of others. For example, the decisions made at the mac and network layers can affect each other, where even though the MAC protocol is designed to minimize some metrics like communication latency, the routing protocol can build high latency paths, because the temporary criterion given by the MAC protocol is not transparent to the network layer. Thus, the paths chosen by the routing protocol to minimize latency can be disrupted by the communications scheduling controlled by the MAC protocol. For consequence, the temporal decisions (taken by the MAC protocol) must benefit from the spatial decisions (taken by the routing protocol).

In order to achieve better performance of the WSN, Cross-layer approaches try to exploit the dependencies between the different layers thus allowing to exert a richer interaction between the different layers of the protocol stack. In other words, this design extends well-defined communications between adjacent layers of the traditional protocol stack to all even non-adjacent layers. It gives great flexibility and freedom, where one protocol can use information from another protocol to achieve its functionalities or two protocols are combined into one new protocol ensuring the functionalities of the two merged protocols.

Low energy consumption is one of the strongest requirements when designing protocols in WSNs. In fact, the main task in WSNs is to capture data from the physical environment and aggregate it to the sink, therefore, fast data aggregation is no less important than energy consumption, especially in real-time applications. Such applications require fast routing of data to the base station to avoid damage.

Since the network layer and the MAC sub-layer play an important role in controlling energy consumption and data routing time, and considering that the cross-layering concept has proved its effectiveness, we aim to present in this paper our cross-layer contribution called Efficient-Depth-ReLO that aims to correlate the decisions of these two layers. Efficient-Depth-ReLO is an approach allowing the construction of TDMA scheduling based on routing protocol information to minimize energy consumption by eliminating sources of energy waste such as: overhearing, idle listening and the frequent switching between the various modes of radio transceivers generated by the various existing works in the literature. On the other hand, it aims to minimize communication latency by resolving efficiently the hidden node problem, to increase the simultaneous

Security Implementation and Verification in Smart Buildings

1st Walid Miloud Dahmane
saad dahlab university
Blida, Algeria
walid.miloud.dahmane@gmail.com

2nd Ouchani Samir
LINEACT, École d'Ingénieur CESI
France
souchani@cesi.fr

3rd Hafida Bouarfa
saad dahlab university
Blida, Algeria
hafidabouarfa@hotmail.com

***Abstract*—The homes are dangerous environments like outside since it contains risks affect on the life of the inhabitant (humidity, temperature, noise, light, etc.), especially with the increase of the attention on smart homes and buildings in the previous few years where studies focused on the IoT domain exclude partially these risks. Smart homes/buildings are equipped with IoT objects that capture the conflicting changes in a controlled manner and introduce actions that stop or declare the existing threats. A mechanism that guarantees to the inhabitant a stable and comfortable life is more than mandatory. In this context, we propose a global approach that defines the architecture of a smart home/building by formalizing the main nodes (sensors, actuator, server, etc.) and the technologies that bind them. Further, we define the characteristics and the functioning of nodes by a formal representation in the form of state machines, the applicable norms to build a secure environment, and further the security measures that must respect them in order to guarantee a protected environment. We finished our study by experimentation with Uppaal, a verification and validation tool, to ensure the accuracy of the system operations that showed a satisfactory results.**

***Index Terms*—Smart Home, Smart Building, Home risks, IoT, MQTT Protocol, Formal verification, Simulation, Uppaal.**

I. Introduction

For a better living quality, the smart spaces paradigm aims at constructing advanced service infrastructures that follow the ubiquitous computing approaches where smart objects are executed on a variety of digital devices and services are constructed as interaction of agents in a communication environment [19]. Recent advances in intelligent computer systems and communications have created the necessary conditions for the networking of a wide variety of heterogeneous devices. This led to the integration of short-range mobile transceivers into everyday life objects and has enabled new forms of communication between objects and even between people and objects. The concept of smart devices, i.e. the inclusion of software, identifiers and networking to devices typically not computerized, led to the "Internet of Things" (IoT) [7]. The main feature of this technology is the integration of heterogeneous and action elements (actuators) in a distributed system which performs different actions based on the information gathered by the sensors combined with the requirements of the particular application [25].

The inside environment has several factors that can affect it or the life of inhabitants or both at the same time (temperature, humidity, noise, light, *etc*). Nowadays different numerical models are available to describe the vapor balance of transient water in a room and predict indoor humidity. A typical room moisture balance includes water vapour production by moisture sources (humans, plants,...), convective water vapour transfer with ventilation air, and water vapour exchange with the building fabric and furniture.The water vapour exchange between room air and surrounding materials (walls and furniture) is governed by three physical processes: the transfer of water vapour between the air and the material surface, the moisture transfer within the material and the moisture storage within the material. The existing models mainly differ in the way this last part of the moisture balance is described [17]. In general, sensors communicate directly with the home gateway and feed the system information with regards to the obtained environment measures, for example light intensity inside a particular room, temperature inside and outside the home and motion sensing to name a few [29].

In this paper, we propose a smart living framework by modeling the different components needed for an indoor environment and developing a trustworthy architecture that ensure the well functioning correctness of such system, and also its configuration and control. First, we rely on the existing limitations and the requirements for a home that can affect the inhabitant like humidity which causes corrosion coating of the wall and household furniture, the appearance of molds and bacteria, the temperature also has to be regulated in the home according to the outside climate, loud noise especially at night, the handicapped can not open the doors of the room, natural and artificial phenomena such as the earthquake and fire that threatens the life of the human. The proposed solutions consider all indoor issues, implement sensors for each measure, collect data in real time and make reactions to prevent risks.

The proposed framework is a web service based solution where sensitive nodes are indoor planted and their measures change in real time. The architecture proposed for the framework considers different classes of nodes. A database node containing the collected data by sensors, a server node that ensures the communication and the reliability between nodes, and reacts when necessary by sending the appropriate control commands; the actuator node executes the received commands from the server and/or external actors who can extract or

Robust Medical image Watermarking method based on DFT and QR decomposition

Abdallah Soualmi, Adel Alti
Department of Computer Science, LRSD Laboratory
University of Sétif-1, P.O. Box 19000 Sétif - Algeria;
sabdallah@univ-setif.dz, adel.alti@univ-setif.dz

Lamri Laouamer
Lab-STICC (UMR CNRS 6285), University of
Bretagne Occidentale 29238 Brest Cedex, France;
laoamr@qu.edu.sa

***Abstract*—the great evolution of information technologies has led to the appearance of new e-health applications which characterized by the voluminous and importance data. However, large quantity of sensitive data are sheared through internet which make it face threat of steal and unauthorized access, to this end it's necessary to put in place new strategy that protect medical data from unauthorized access. This paper aims to propose a new robust watermarking approach for protecting sensitive medical data, using DFT transform and QR decomposition. The main idea is the embedding of the watermark in the DFT coefficients of the QR coefficients. Simulations results prove that the proposed technique could find a good consensus between robustness and imperceptibility.**

Keywords— Digital watermarking; Robust, Discrete Fourier Transform (DFT); QR decomposition; sensitive data protection.

I. INTRODUCTION

The emergence of new digital communications and advanced multimedia technologies leads to the appearance of new applications that transfer a huge and important amount of data over unprotected network, where data could face alteration or unauthorized access, consequently, the data authorship could be lost or stolen. To this end, new strategies that consider the special characteristics must be proposed.

The cryptography was the first solution which consists of making data unreadable by unauthorized party, but once data decrypted the ownership proofing and copyright cannot ensured more [17].

The watermarking technique was raised as a compliment of cryptography for felling their gapes. Its could protect copyright, proofing the authorship and/or integrity checking [2]. It consists of embedding watermark data into a cover document (image, video…etc.) [18]. The watermark data may be employed in the spatial domain where it is embedded directly in the image pixel by modifying their intensity [12], or in frequency domain [3] where it is embedded in the original image transform.

the watermarking techniques could be clasified according to the robustness: robust, semi-fragile, and fragile [11]. In robust watermarking approach's, the watermark data must resist after any attack applied on the watermarked image, while, in semi-fragile, the watermark must resist minors attacks. In fragile watermarking, the watermark collapsed after any intentional or unintentional operation. In terms of the watermark extraction: the watermarking techniques can be classified as blind, semi-blind and non-blind techniques [10, 16]. For the first kind, the extraction process doesn't require any of the original or watermark image. For the second type, the extraction process necessitates the presence of the original watermark, while for the last one, the original image is required. Therefore, the robust image watermarking method have new challenges which that the proposed method must resist all watermarking attacks. To realize this, several image watermarking techniques have been studied [4-9]. Frequency techniques are considered as an efficient technique, since they could offer high robustness. In this paper, our purpose is to develop a new medical image watermarking which allow high robustness while preserving medical image quality.

The rest of paper is organized as follows. Section 2 describes recent related works. Section 3 presents the proposed approach in detail. Section 4 presents the experimental results and discusses the corresponding results. Finally, the conclusion is presented in section 5.

II. RELATED WORKS

Frequency based watermarking method gives better robustness than the spatial based. To this end, in our literature study we focus on some recent transform watermarking techniques existing in literature [4-9].

In Hanet al. [4], proposed a hybrid technique based on Discrete Fourier Transform (DFT), Discrete Wavelet Transform (DWT), Discrete Cosine Transform (DCT) and Hermite chaotic neural network. The main idea is to apply the DWT and DFT on the cover medical image, after that select the low and median frequency band as data features; where these last are used to generate the watermark. The watermark is scrambled using Hermite chaotic neural network and encrusted in the DCT coefficients of the original image. This approach offers good trade-off between robustness and imperceptibility, however it tested only against few attacks and it requires an important

Lightweight CNNs-Based Object Detection for Embedded Systems implementation

Abdelmalek Bouguettaya, Ahmed Kechida and Amine Mohammed Taberkit

Research Center in Industrial Technologies (CRTI)
Po. Box 64, Cheraga 16014
Algiers, Algeria
bouguettaya.abdelmalek@gmail.com, a.kechida@crti.dz, taberkit.amine@yahoo.fr

***Abstract* – Deep Learning algorithms, based on the implementation of Convolutional Neural Networks (CNN), are more and more used in Artificial Intelligence (AI) applications, especially in the image recognition field, like image classification, object detection, segmentation. These algorithms learn from training data a set of parameters to create a model, which is capable of performing a classification task with high accuracy. The most recent models consist of millions of parameters, which make it computationally very exhausting, especially in the field of embedded systems where resources are very limited. Recently, deep learning and computer vision are highly used to realize a fully-autonomous drone and self-driving cars, which does not need human intervention. Computer vision is a field focused on enabling drones to interpret and understand the content of an image or a video using CNNs. This paper focuses on reviewing recent lightweight CNNs architectures used that can be implemented on embedded targets**

Keywords - Computer Vision, Deep Learning, Object Detection, Convolutional Neural Network, lightweight CNN.

I. INTRODUCTION

Today, with the emergence of Internet of Things and embedded systems, artificial intelligence and computer vision has entered our lives. Our smartphones use it to improve the quality of our photos, autonomous drones to understand their environment. In general, our embedded systems analyze more and more images.

Most of the applied deep learning operations are made on very powerful workstations or servers. This is because deep neural networks perform convolutions, which are very expensive operations in the calculation and memory. The classification of images in on-board embedded systems is, therefore, a major challenge due to material constraints.

In the last few years, deep learning has shown accuracy in many applications. Thanks to Moore's law [1], we are able to implement high-performance processors in a single small chip, which gives us the ability to implement very efficient deep learning algorithms in these little chips in order to build a fully autonomous drone that could navigate without the intervention of humans or making smartphones with high capabilities. Also, we have many efficient software tools at our disposal, like Keras, Tensorflow, and Theano. These hardware and software give us the ability to rapidly construct deep learning architectures in a fraction of the time, while it took us just a very long time before.

Computer vision is one of the topics that is advancing rapidly thanks to deep learning. Today, deep learning computer vision is helping self-driving cars and autonomous drones by figuring out where are other objects (pedestrians, cars, traffic signs) to avoid them. It is making face recognition much better than ever before. Rapid advances in computer vision are enabling us to build new applications that were impossible a few years ago. Thanks to CNN [2], we can use large images instead of stacking with small images.

The purpose of computer vision is allowing computers or robotic systems to analyze, process and understand the content of digital images acquired with cameras so that they can decide how to act. For a while, we needed to apply a hand-engineered algorithm, where a hand-defined set of rules and algorithms are applied to extract features from an image. However, the Convolutional neural network is an end to end model that gives us the possibility to skip the feature extraction step. This step is automatically learned from the training process. Researchers needed to develop a deep neural network to detect objects. Several studies have been made to tackle the object detection problem using CNN.

A large number of CNN architectures have been developed to achieve high accuracy on many datasets, like ImageNet. In such competitions computing power is not limited, where they use very powerful GPUs. However, we may want to run our model on an old laptop without GPU, on our smartphone, or even on autopilot for drones. In this paper, we will present an overview of the most common and recent lightweight CNN-based approaches, which were used for embedded systems implementation.

II. PREVIOUS WORKS

There were many different techniques for detecting objects applied on datasets like PASCAL VOC, MS COCO, ImageNet. Paul Viola and Michael Jones came up, in 2001, with a very effective object detection method [3], and in 2002, it was improved by Rainer Lienhart and Jochen Maydt [4]. Viola-Jones still one of the most powerful algorithms for computer vision and real-time object detection. Other methods, like HOG+SVM [5] and DPM [6], present good accuracy in the mentioned datasets. It is slowly being surpassed by deep learning-based CNN algorithms in terms of accuracy.

Girshick et al. [7], proposed Region-based Convolutional Neural Networks (R-CNN), which achieve impressive object detection accuracy, over traditional methods. However, the R-CNN is very slow, where detection time takes 47s per image. Besides, the extracted features need a huge storage memory, hundreds of Gigabytes [7]. Faster R-CNN [8] and Faster R-CNN [9] have come to enhance the accuracy and speed of R-CNN architecture. However, they still slow achieving only 7 fps, which is not suitable for real-time object detection.

Single-stage detectors are significantly faster than two stages of detectors (region-based methods), and give us a real-time performance. YOLO [10, 11, 12] and SSD [13] are the most used algorithms for real-time object detection, where many works are based on these two architectures. They are prerequisites for any self-driving cars and autonomous drones.

An OFDMA MAC Protocol Aggregating Variable Length Data in the Next IEEE 802.11ax Standard

Mohand MOKTEFI, Mohand YAZID and Louiza BOUALLOUCHE-MEDJKOUNE
LaMOS Research Unit, Faculty of Exact Sciences, University of Bejaia, 06000 Bejaia, Algeria
Emails: moktefi.mohand@gmail.com, yazid.mohand@gmail.com, louiza_medjkoune@yahoo.fr

***Abstract*—A new standard of the IEEE 802.11 standard is behind the scenes whose ratification is planned for the end of the current year (2019). It is the 802.11ax or HEW (High Efficiency Wireless local area network) standard dedicated to the future wireless networks. This standard promised better efficiency and throughput in more difficult use cases (dense environments) by exploiting pre-existing physical and MAC (Medium Access Control) capabilities and introducing new concepts, such as: OFDMA (Orthogonal Frequency-Division Multiple Access), 1024-QAM (1024-Quadrature Amplitude Modulation) modulation order, FD (Full-Duplex) communications and spatial reuse. The new OFDMA modulation technology divides the transmission channel into sub-carrier groups (known as: RUs for Ressources Units) to which up to 9 users can simultaneously access a 20 MHz channel. In order to improve the user data rate in dense areas, an OFDMA-based MAC access method is proposed in this paper by enabling the principle of aggregating frames of variable lengths while ensuring synchronization. Our proposal is followed by simulation results to demonstrate the improvement in throughput that it offers.**

***Keywords*—IEEE 802.11ax HEW, OFDMA, Medium Access, Variable Length Data, Aggregation, Simulation and validation.**

I. Introduction

Wireless technology has become widespread on virtually all user devices, as well as any inhabited deployment (homes, parks, airports, stadiums, etc.) since its arrival on the industrial market. However, users who are increasingly demanding, the number of connections and bandwidth intensive applications are growing. This increase will threaten the technology in its future growth to no longer serve these customers effectively. In addition to increased reliability, future networks will need to offer greater wireless capacity. This is where the sixth generation of Wi-Fi (Wireless-Fidelity) comes in. It's the IEEE 802.11ax standard.

The new 802.11ax standard, also known as HEW (High Efficiency Wireless local area network), has the ambitious goal of quadrupling average throughput per user in dense areas; it is an evolutionary improvement of the 802.11ac standard. The standard has submitted three preliminary drafts 802.11ax since its launch in May 2014, namely D1.0, D2.0 and D3.0 and provides for finalization by the end of the current year (2019) [1]. While the new 802.11ax standard is designed to maximize network efficiency, it also provides a better experience for traditional wireless LANs and more predictable performance for advanced applications, such as: 4K video, Ultra HD, wireless office, Internet of Things (IoT), etc. IEEE 802.11ax will achieve its goals taking into account the following key features: Orthogonal Frequency-Division Multiple Access (OFDMA), adoption of Full-Duplex transmissions, higher modulation rate 1024-QAM (1024-Quadrature Amplitude Modulation),Down-Link/Up-Link Multi-User Multiple-Input Multiple-Output (DL/UL MU MIMO) and spatial reuse.

The implementation of these techniques poses many new challenges to the scientists who are working to achieve. Because the old Wi-Fi standards do not support these new features. In this work, we are interested to efficiently manage the OFDMA MAC communications in the next generation of IEEE 802.11ax WLANs. In fact, various methods of access to the medium based on OFDMA have been proposed by the scientific community, each aimed at optimizing the use of subcarriers and improving the transmission rate in a dense environment.

The remainder of this paper is outlined as follows. Section II introduces the OFDMA and OFDM technologies. Section III introduces the main research works about multi-user MAC protocols based on OFDMA technology. In Section IV, we describe our OFDMA MAC protocol. Simulation results are given in Section VI, followed by Section VII which concludes this paper.

II. Background

The main change in the 802.11ax standard is the introduction of OFDMA technology in both downlink and uplink transmissions. OFDMA makes it possible to multiplex more users in the same bandwidth. This is possible by allocating a contiguous subset of the sub-carriers (minimum 26, maximum 996) of the available spectrum for each user. This means that the existing 802.11ax channels (20, 40, 80 and 160 MHz wide) are divided into narrower subchannels with a predefined number of subcarriers. The allocated amount is referred to as the *Resource Unit* (RU) and it is allocated to users based on channel conditions and service requirements. The Figure 1 illustrates the allocation of RUs by the AP (Access Point). By using OFDM the entire channel is allocated to a single user, however using OFDMA several users can transmit simultaneously. The basic principle of OFDM and OFDMA is illustrated by Figure 2.

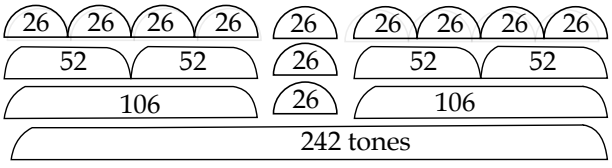

Fig. 1. Configuration of RUs on a 20 MHz band [2].

Comparative Study of the Main Full Duplex MAC Protocols in the Future Generation of HEW WLANs

Kenza HOCINI and Mohand YAZID
Research Unit LaMOS (Modeling and Optimization of Systems), Faculty of Exact Sciences,
University of Bejaia, 06000 Bejaia, Algeria
Emails: hocinikenza1@gmail.com, yazid.mohand@gmail.com

***Abstract*—The future standard IEEE 802.11ax aims at improving spectral efficiency and area throughput in real world densely deployed Wi-Fi (Wireless-Fidelity) environments. For this purpose, several modifications at both Physical (PHY) and Medium Access Control (MAC) layers have been incorporated. Among these new amendments, we focus on Full Duplex (FD) technology, which double the throughput of the Half Duplex (HD) radio without any effort. In this paper, our main goal is analyzing and comparing the two main MAC protocols existing for enabling the innovative Full Duplex technology in the incoming IEEE 802.11ax standard designed for HEW (High Efficiency WLANs : Wireless Local Area Networks) networks, namely: OFDMA Two-symbol Coordination MAC (O2-MAC) and In-Frame-Querying. These protocols allow to solve the same problem, which is maximizing the radio capacity of full duplex transmissions. The simulation results obtained show for the first time that, the In-Frame-Querying protocol is efficient in case where the down-link (DL) and up-link (UL) data flows have variable lengths. In contrary, when the length of down-link and up-link data flows are the same, the O2-MAC protocol is the best. The performance metrics considered in the analysis are throughput and overhead.**

***Index Terms*—HEW, IEEE 802.11ax, Full Duplex Technology, O2-MAC, In-Frame-Querying, Simulation and Comparaison.**

I. Introduction

Recently, IEEE 802.11 has started a task group to investigate and deliver next generation Wireless Local Area Network (WLAN) technologies for the scenarios of dense networks with a large number of stations (STAs) and access point (AP). Due to the significant network capacity increase achieved by 802.11ax, the term High Efficiency WLANs (HEW) is also used in reference to this new amendment. The IEEE approved 802.11ax (HEW) in March, 2014 [1], which will replace both IEEE 802.11n-2009 and IEEE 802.11ac-2013 [2]. The scope of 802.11ax amendment is to define standardized modifications to both Physical (PHY) and Medium Access Control (MAC) layers. These modifications enable at least one mode of operation capable of supporting at least four times improvement in the average throughput per station in a dense deployment scenario (stadium, train, apartment building,...) [1].

For this, several modifications have been proposed at PHY and MAC layers [3], including: Orthogonal Frequency Division Multiple Access (OFDMA), dynamic channel bonding, Down-Link/Up-Link Multi-User Multiple-Input Multiple-Output (DL/UL MU MIMO), muti-user aggregation, spatial reuse, Transmit Power Control (TPC), Basic Service Sets (BSS) color, higher order cording rate 1024 Quadrature Amplitude Modulation (1024 QAM) and Full Duplex technology (FD). Among these new amendments, we focus on Full Duplex technology, which double the throughput of the Half Duplex (HD) radio without any effort [4]. Full-duplex radio with single antenna based on self-interference cancellation (SIC) technology has been recently introduced [5] at the PHY layer of the IEEE 802.11ax standard. This means that, it is possible to simultaneously transmit and receive data on the same channel, which was assumed to be impossible in the previous version of the IEEE 802.11 standard [6].

In this paper, we implement, simulate and compare the two main Full Duplex MAC protocols designed for High Efficiency WLANs. The first is OFDMA Two-symbol Coordination MAC (O2-MAC) based on the assumption that the length of down-link (DL) and up-link (UL) data flows are the same. The second protocol is In-Frame-Querying which considers that the down-link data flow is many times larger than the up-link data flow. Both of them have the same goal, which is maximizing the efficient use of Full Duplex transmissions.

The rest of this paper is structured as follows: Section II is divided into two sub-sections, we overview Full Duplex technology in the Subsection II-A. In the Subsection II-B, we present a state of the art on the Full Duplex transmissions. In Section III, we describe and compare the two main Full Duplex MAC protocols: O2-MAC and In-Frame-Querying. Performance study and comparison is conducted in Section IV. We end our paper with a conclusion in SectionV.

II. Related Works

In this section, we review in one hand, the Full Duplex technology. In the other hand, we present state of the art focused on Full Duplex MAC protocols in IEEE 802.11ax.

A. Background

Full Duplex technology has attracted attention as a viable solution to increase the spectral efficiency [7]. Full Duplex operation enables wireless terminals to transmit and receive simultaneously over the same frequency band. Then, the channel capacity can be theoretically doubled [4]. However, Full Duplex operation yields self-interference (SI) which is generated from its own transmitted signal and interferes with desired received signal. Note that since the SI is much larger

Deep Learning Trends and Techniques in Facial Expression Recognition: *an overview*

Meriem Sari
Department of Computer Science
University of Ferhat Abbas Setif1
Setif Algeria
sari.meriem21492@gmail.com

Abdelouahab Moussaoui
Department of Computer Science
University of Ferhat Abbas Setif1
Setif Algeria
abdelouahab.moussaoui@univ-setif.dz

Abdenour Hadid
Center for Machine Learning and Signal Analysis
University of Oulu
Oulu Finland
hadid.abdenour@oulu.fi

***Abstract*—Facial expression recognition (FER) plays a key role in conveying human emotions and feelings. Automated FER systems enable different machines to recognize emotions without the help of humans; this is considered as a very challenging problem in machine learning. Over the years there has been a considerable progress in this field. In this paper we present a state of the art overview on the different concepts of a FER system and the different used methods; plus we studied the efficiency of using deep learning architectures specifically convolutional neural networks architectures (CNN) as a new solution for FER problems by investigating the most recent and cited works.**

Keywords—Facial expression, recognition, emotion, machine learning, deep learning, convolutional neural network, computer vision, basic emotions.

I. INTRODUCTION

Facial expression is one of the most important aspects of biometry; it has been regarded as a fresh and active research field in the last decade due to its importance in translating a person's internal and emotional state. Even though this latter analysis can be done through other features such as: voice [1], body gestures, social and contextual parameters of the situation [2] among others facial expression remains to be the most expressive way through which human beings can display their emotions because compared to others, it has a high level of directness, friendliness, convenience and robustness.

Nowadays, facial expression recognition (FER) has known a large number of applications thanks to the huge amount of attention that it got. It is mostly used in human machine interaction (HCI) applications such as; interactive gaming, digital entertainment, virtual reality and robotics. It is also used in emotion and behavioural analysis in the medical domain (Autism [3], mental disorder [4], pain assessment [5]) also used in surveillance and law enforcement applications.

Facial expression was first introduced as a research field by Darwin in his book "The Expression of the Emotions in Man and Animals" [6], and then it was studied by many other scientists. In the recent few decades the work of Paul Ekman has been considered as the cornerstone of almost all the research done in this field [7]; Ekman introduced the six basic emotions [8] which are; happiness, sadness, anger, disgust, fear, surprise plus the neutral emotion that is considered in most of the works, these emotions became universal among human beings.

Automated FER System (AFERS or FERS) is the very complicated process for machines to automatically recognize emotions without any help from human beings. This system receives as input images that contain faces, it performs some processing that will be cited in the next section and then gives as output the recognized emotion. Even though it seems to be a very simple task for humans, it represents a very challenging one in the world of machine learning. In this paper we try firstly to give a brief summary on the FER concepts enriched by what scientists had accomplished over the years then we present a comparative study of the most recent works that have been done in the field using deep learning.

The rest of the paper is organized as follow: next section represents a background review about FER concepts. Section III represents a comprehensive study for FER problems using deep learning. Observations and discussion are presented in section VI then conclusion and future directions in section V.

II. BACKGROUND REVIEW

FERS can be divided into two main categories in terms of inputs; i.e. it can take images or dynamic sequences; in either cases; the AFE analysis is done via three important steps:

A. Face Acquisition

Over the years there have been many methods developed to detect faces in an arbitrary scene [9-14], some can detect only frontal view faces while others can work even on multi-view faces such as side views, the most common and used technique for face detection is the algorithm of Viola and Jones [15].

B. Feature Extraction and Representation

After locating the face, the next phase is to extract information from the input data known as features. In this process variety of features can be retrieved and based on this we can categorize the used methods for feature extraction. Over the literature, the facial characteristics are divided into two main categories:

Geometric features and they represent the shape and location of facial components (mouth, eyes, eyebrows, nose)

Language Modeling based on Arabic Algerian Oranee Dialectal Corpus

Mezzoudj Fréha
Computer Science Department
Université Hassiba Benbouali Chlef
Chlef, Algeria
f.mezzoudj@univ-chlef.dz,
freha.mezzoudj@yahoo.fr

Hammouche Djamila
Computer Science Department
Université Hassiba Benbouali Chlef
Chlef, Algeria
d.hammouche@univ-chlef.dz

Loukam Mourad
Computer Science Department
Université Hassiba Benbouali Chlef
Chlef, Algeria
m.loukam@univ-chlef.dz

Fatma Zohra Belkredim
Computer Science Department
Université Hassiba Benbouali Chlef
Chlef, Algeria
f. belkredim @univ-chlef.dz

Abstract*— The Modern Standard Arabic (MSA) is the formal language used in the Arab world. In Algeria, the MSA and other varieties of informal Arabic dialects are used in the everyday matter communication. These dialects differ from the standard Arabic form. Though they have their particularities, they are still mutually intelligible. They are by no means subject to further regional variations: eastern, western, central or southern. The Oranee dialect (OranD) is the most important and used one in the west of Algeria. However, it is an under-resourced language, which lacks both audio and textual corpora. We present, in this paper, the most particularities of this western Algerian dialect and introduce a natural language processing on an Oranee textual corpus.

Keywords— Algerian dialect, Modern Standard Arabic, Oranee dialect, Natural Language Processing, Language Modelling, Speech Recognition.

I. INTRODUCTION

Arabic is the most important and widely spoken and written Semitic language. The term "Arabic language" is often used to refer to a collection of multiple variations: Ancient Arabic (AA), Classical Arabic (CA), Modern Standard Arabic (MSA) and spoken Arabic Dialects (AD). In general, dialects are variations of the same language, specific to geographical regions or social groups. The main Arabic dialects are four: Gulf, Levantine, Egyptian and Maghrebi. The Maghrebi Arabic includes the dialects of Tunisia, Morocco, Mauritania, Libya and Algeria [1].

Since early time, the Tamazight and the Arabic languages were used in liturgical and everyday language in Algeria. The contact with other invaders in Algeria such as Spanish colonialism (15th century), the Ottoman- Turkish command (1518 - 1671) and the European inhabitants (in the nineteenth century) during French colonization (1830-1962) have participated to create new language practices such as the use of many Algerian Arabic dialects including foreign words.

Officially, Algeria is presented as a society in which standard Arabic is the used language. Unfortunately, MSA is the language used (written and spoken) only by the Intelligentsia community. However, the most vocabulary of the Algerian Arabic dialects, used in the daily life, is from MSA, but different languages, which have existed in the Algerian territory in different periods of its history, also influence them.

Investigating in Dialectal Arabic is useful for many research directions [2] such as Spoken Arabic Dialect Identification, Collecting Arabic Dialect Corpora, Arabic Dialect Machine Translation, Text Diacritization in Arabic Dialect, etc. There is also many works made on the textual data, like Arabic Dialect Word Segmentation and Arabic Textual Dialect Identification, language modelling etc. In the current work, we are interested in textual monolingual corpora written resources but not on word lists, lexicons, speech, and opinion corpora yet: by collecting and modelling a first version of a textual Oranee Dialectal Algerian Arabic corpus.

Some phonetic characteristics and vocabulary of the latent's dialect could affect their MSA pronunciation and oral discourse. Also, an MSA transcribed discourse could contain some dialect vocabularies. Therefore, we propose to interpolate an MSA language models with the dialectal one in this experimental work.

The reminder of this paper is as follows. In the next section, we review some related work that have been built corpora for both MSA and Algerian dialects. In section 3, we give a brief description of Algerian dialects features in general and particularly for Oranee one. These particularities are respected during the choice of the corpus text. In section 4, first we introduce the dialectal language modeling and then their interpolation with an MSA language models. Finally, we conclude about the most important results and identify some directions for future works.

II. RELATED WORKS

Language resources are an essential component in all natural language processing (NLP) applications and they are divided into written and oral resources [3]. Therefore, it is necessary to provide as much flexible and standard resources as possible, for the Arabic NLP community.

The authors in [4] present an ALGerian Arabic Speech Database (ALGASD) recorded from 200 phonetically rich and balanced Arabic sentences (1080 utterances) by 300 Algerian native speakers selected from eleven departments (dubbed *Wilayas*) with different regional accents of MSA spoken in Algeria. The ALGASD corpus was used in some

Shot Boundary Detection: Fundamental Concepts and Survey

1st Benoughidene Abdel halim
Department of computer science
University of Batna 2
Batna, Algeria
benouhalim@gmail.com

2nd Titouna Faiza
Department of computer science
University of Batna 2
Batna, Algeria
ftitouna@yahoo.fr

***Abstract*—A great part of the Big Data surge in our digital environments is in the form of video information. Hence automatic management of this massive growth in video content seems to be significantly necessary. At present researches topic on automatic video analyses includes video abstraction or summarization, video classification, video annotation and content based video retrieval. In all these applications one needs to identify shot boundary detection. Video shot boundary detection (SBD) is the process of segmenting a video sequence into smaller temporal units called shots. SBD is the primary step for any further video analyses. This paper presents the fundamental theory of the video shot boundary, and a brief overview on shot boundary detection approaches and their development. The advantages and disadvantages of each approach are comprehensively explored and challenges are presented. In addition to that, we focused on the machine learning technologies such as deep learning approaches for SBD could be directed as new directions for the future.**

***Index Terms*—Shot Boundary Detection(SBD), Cut Transition (CT), Gradual Transition (GT), Temporal Video Segmentation, Video Content Analysis, Content Based Video Indexing and Retrieval (CBVIR), Feature Extraction, Machine Learning, Deep Learning, Convolutional Neural Networks (CNN), Multimedia Big Data.**

I. Introduction

With the rapid development of computer networks and multimedia technology, the amount of multimedia data available every day is enormous and is increasing at a high rate, as well as the ease of access and availability of multimedia sources, which leads to big data revolution Multimedia.

Video is the most consumed data type on the Internet such as YouTube, Vimeo or Dailymotion, Yahoo Video, social networking sites like Facebook, Twitter, Instagram, etc. The explosive growth in video content leads to the problem of content management. However, people spent their time uploading and browsing huge videos to determine whether these videos were relevant or not, this is an difficult and stressful task for humans [1]. In such a scenario, it is necessary to have automated video analysis applications to represent information stored in large multimedia data. Such techniques are grouped into a single concept of Content-Based Video Indexing and Retrieval (CBVIR) systems. These applications include browsing of video folders, news event analyses, intelligent management of videos, video surveillance [2], key frame extraction [3], and video event partitioning [4]. In addition, the video summary is the best and most effective solution for converting large, amorphous videos into structured, concise, clear and meaningful information. The main task of summarizing a video is to segment the original video into shots and extract key frames from the shots, which will be the most representative and concise of the entire video [5].

Video shot boundary detection (SBD) is also called shot segmentation, is the first process in video summarization, and its output significantly affects the subsequent processes. The main idea of video shot boundary is extracting the feature of video frames, and then detecting the shot type according to the difference the feature. There are two kinds of video shot boundary detection: Cut Transition (CT) and Gradual Transition (GT) [6]. In general, the performance of the shot boundary detection algorithm depends on its ability to detect transitions (shot boundaries) in the video sequence. Whereas, the accuracy of detection of shot boundary detection generally depends on the extracted features and their effectiveness in representing the visual content of video frames and the computational cost of the algorithm, which needs to be reduced [7]. Practically, there are some effects that appear in a video shot such as: flash lights or light variations, object/camera motion, camera operation (such as zooming, panning, and tilting), and similar background. Currently, there is no complete solution to these problems or most of them in the same algorithm. In other words, a favorable and effective method of detecting transitions between shots is still not available despite the increased attention devoted to shot boundary detection in the last two decades. This unavailability is due to randomness and raw video data size. Hence, a robust, efficient, automated shot boundary detection method is a necessary requirement [8].

Most of the existing reviews are not covering the recent advancements directionsin the field of shot boundary detection as deep learning. This paper mainly focusing on review and analyze different kinds of shot boundary detection algorithms that are implemented in the uncompressed domain following their accuracy rate, computational load, feature extraction technique, advantages, and disadvantages. Future research directions are also discussed.

Denoising of Speech Signal Using Decision Directed Approach

Ouardia Abdelli
LISIC Laboratory, Telecommunications Department
USTHB University, Algiers, Algeria
ouar_ing80@hotmail.com

Fatiha Merazka
LISIC Laboratory, Telecommunications Department
USTHB University, Algiers, Algeria
fmerazka@usthb.dz

Abstract– **This paper treats the problem of speech enhancement in noisy environments using the decision directed (DD) approach and compared it with other methods as LogMMSE and Weiner method with two approach TSNR and HRNR. The DD approach used for a priori the signal to noise ratio (SNR) estimation and speech enhancement. In this paper, we propose recursive estimators for the a priori SNR and the speech spectral components. We introduce a novel statistical model that takes into account the time-correlation between successive speech spectral components, while keeping the resulting algorithms simple. This model provides new insight into the DD approach, and enables the extension of existing speech enhancement algorithms.**

Keywords-spectral attenuation,signal and noise, suppression rule, SNR, HRNR, TSNR; spectral atténuation

I. INTRODUCTION

With the growth of technology in the field of mobile telecommunications, the need to improve the sound, particularly by reducing the noise annoyance, became in creasingly present. Noise reduction techniques are subject to acompromise between the actual level of reduction and distortion that affects the speech signal [1],[2]. On current performance, it is desirable to remove more noise while maintaining an acceptable level of degradation of the restored signal, especially when the noise level is important.

The quality of the speech signal transmitted to the remote party to increase its intelligibility and reduce fatigue of the latter, it appears important to develop noise reduction systems whose purpose is to extract useful information by performing a treatment on the noisy observation signal.In addition to these applications of spoken communication, improving the quality of the speech signal is also required for speech recognition, whose performance is highly altered when the user is immersed in a noisy environment[3].

The techniques that have generated the most interest in recent years are the short-term spectral attenuation approaches that involve modifying a short-term transform of the noisy signal using a suppression rule [1],[2]. The development of this family of techniques is mainly due to the fact that they allow to meet real time constraints and complexity inherent in applications of spoken communication ease of use. A popular statistical model for speech enhancementwas proposed in ,[3]. Accordingly, the individual short-term spectral components of the speech and noise signals are modeled as statistically independent Gaussian random variables.

In this paper,the decision directed (DD) approach is used to estimate the time varying noise spectrum which results in better performance in terms of intelligibility and reduced musical noise. However, the a priori signal to noise ratio (SNR) estimator of the current frame relies on the estimated speech spectrum from the earlier frame. So, we can formulate a short time spectral gain using Wiener filtering with DD approach in which frame delay results in an annoying reverberation effect. The problem is solved by temporal SNR (TSNR), wherein, a second step is formulated so as to remove the delay and Harmonic Regeneration Noise Reduction (HRNR) algorithm which is used to regenerate the harmonics in the reconstructed signal.

This paper is organized as follows. In Section II, we present the parameters and rules of speech enhancement techniques by method short-term spectral attenuation, we introduce a tool useful to analyze the SNR estimators. In Section III, we recall the principle of the DD approach and analyze it and. we present and analyze the TSNR and HRNR techniques. Finally, inSection III, we demonstrate the improved performance of the Harmonic Regeneration Noise (HRNR) and TSNRcompared to Wiener and (MMSE) methods.

II. ADDITIVE NOISE MODEL

The single-channel case considered, the goal is to estimate the useful speech signal $s(n)$, the latter being disturbed by additive noise b(n) assumed to be independent of the speech signal, from the one observed signal $x(n)$ [1],[2].[3] It can be discretized and mathematically represented as,

$$x(n) = s(n) + d(n) \quad (1)$$

Enhanced Collisions rate by a new Adaptive and Fair Binary Exponential Backoff

N. ZERGUINE
Computer science department
Ferhat Abbes University
Setif 19000 Algeria
nadia.zerguine@univ-setif.dz

Z. ALIOUAT
Computer science department
LRSD Laboratory
Ferhat Abbes University
Setif 19000 Algeria
zaliouat@univ-setif.dz

M. MOSTEFAI
Electrotechnical Department
LAAS Laboratory
Ferhat Abbes University
Setif 19000 Algeria
mostefai@univ-setif.dz

***Abstract*—MANETs have been receiving increasing attention during the last few years and applied in many areas.The most majority of wireless technology is based on the IEEE 802.11 DCF standard. To treatthe collisions in wireless networks, the MAC layer of the IEEE 802.11 DCF uses the Binary Exponential Backoff (BEB) algorithm, which is effective in reducing the probability of collision but at the cost of many networks performances measures such as throughput, energy consumption, equity, etc. Several researches have been done to improve the performance of MAC layer of IEEE 802.11 in MANETs. This work presents some of these approaches and proposes a new algorithm to address the problem of equity, throughput and energy consumption in a mobile environment. The algorithm is simulated under NS2 simulator.The results showthe performance of the proposed algorithm in reference to the BEB of the IEEE 802.11DCF, the Improved Binary Exponential Backoff (IBEB) and the New Binary Exponential Backoff (NBEN).**

Keywords—MANET, IEEE 802.11, MAC, BEB, Equity, Throughput, Energy consumption.

I. INTRODUCTION

The technological development that has experienced the world has affected all areas, particularly the communication sector that knows a remarkable evolution by the appearance of the wireless technology. This last allows the establishment of a wireless communication in mobile environments that offer great flexibility of employment. In particular, the mobile ad-hoc networks (MANET) are a new paradigm of mobile networks. They are built by the interconnection of different unknown mobile entities without any fixed infrastructure or a centralized control. No base station comes into play; they are local networks using the radio medium. However, the radio channel is limited, the bandwidth available for communication is also limited, and the nodes are mobile and move freely, making the topology of the network frequently changing and unpredictable. Shared medium access should be controlled in such a way that all nodes receive a fair share of the available bandwidth, and that bandwidth is used efficiently without depleting network resources. This control is performed at the level of the MAC (Medium Access Control) layer and, because of all the obstacles posed by the MANETs, it is difficult to obtain a control of medium access simple, effective, equitable and energy saving.

The IEEE 802.11 MAC protocol is the standard for wireless LANs. However, this protocol was not designed for multi-hop networks. Although it can support some Ad Hoc network architectures, it is not intended to support the mobile Ad Hoc network, in which multi-hop connectivity is one of the most important features. The effectiveness of MAC protocols can be measured using two parameters: the probability of collision and the equity channel allocation to the competing nodes. The IEEE 802.11 attempts to solve the collision problem by following the Binary Exponential Backoff (BEB) algorithm. The BEB scheme is the typical Carrier SenceMultiple Access / Collision Avoidance (CSMA/CA) mechanism introduced in IEEE 802.11 DCF [17]. This backoff mechanism used almost in all wireless medium access protocols (contention-based) is essentially borrowed from wired Ethernet where the non-uniform nature of the media does not exist. Thus, the BEB process that provides equitable access to the medium in wired networks becomes the cause of injustice in wireless networks.It suffers from both equity and efficiency. The injustice of the MAC protocol has a considerable impact on the behavior of higher layer protocols and applications using the network. Since the equity problem is deeply rooted in the MAC layer, it is reasonable to conclude that it can be solved by modifying the MAC code appropriately. To this end, in this article, we present a new backoff algorithm, called Opposite BinaryExponentialBackoff (OBEB) that can overcome the limitations of existing solutions. In this proposal, a linear increase or reduction according to the index of the fibonacci sequence is made in the case of success or collision transmission respectively. The results of the different simulations show that the proposed algorithm achieves, when used in an ad hoc mobile environment, a better throughput, residual energy and a higher delivered packet rate than the BEB used in the IEEE802.11 DCF standard, the IBEB and the NBEB.

The rest of the paper is organized as follows: Section 2presents the existing works. Section 3 describes the new OBEB algorithm. Section 4 presents the different simulations and results obtained. Finally Section 5 concludesthiswork.

Simulation Study of Video Transmission by OpticalFiber

[1]Nadira BOUKHATEM, [1]Salah TOUMI,[2]El-Bey BOURENNANE,
[1]Abdelghani REDJATI, [1]Abderraouf FARES
[1]Laboratory LERICA
Department of Electronics, BadjiMokhtar University, Annaba,Algeria
E-mail:boukhatemnadira@yahoo.fr, salah.toumi@univ-annaba.org,
redjati@yahoo.fr,faresabderraouf93@gmail.com,

[2]Laboratory ImVIA
Burgundy University, Dijon, France,
E-mail:ebourenn@u-bourgogne.fr

Abstract: **The migration to the use of optical fiber has required several developments, because nowadays it is the most widely used transmission medium in vast fields, particularly video transmission. The work carried out made it possible to study, evaluate and analyze the implementation of this transmission system. We examined the characteristics of the operating techniques of each channel of the video transmission chain and found several problems, one of which is the performance of error-correcting codes based on coding and decoding algorithms, optical fiber and these several criteria for which we have the rate, propagation distance and good transmission quality, which implies that there is always research and improvements in this area.**

Keywords: Telecommunications networks; optical fiber; video coding; video transmission.

I. INTRODUCTION

The last decade has been marked by the rapid evolution of the information and communication technology (ICT) sector, including telecommunications and the Internet. Solutions have been developed by allowing devices to connect to the Internet from an access point without the need for a cable connection [1]. The rapid increase in video applications on wired (optical fiber...) and wireless (LTE, wimax...) standards allowing real-time video transmission for various applications such as video conferencing, telemedicine, video streaming, digital terrestrial television [2]. Thus the production of multimedia content has become accessible to all audiences and at a low cost. This development makes it possible to achieve better video quality, from the digital that is beginning to grow, to HD TV and then to 8k. Current researchers are working on a thorough analysis of video characteristics on different types of networks to optimize transmission and to efficiently and adaptively route video data from the source to the destination that requires a transport protocol. A network path includes a succession of links, each with its own bandwidth [3] which is not the only factor that affects network performance. The error rate in channels must be minimized by designing an appropriate transmission means that allows specific treatment for losses between connection on the wirelinenetwork and on the wireless network [4], i.e. compression is a viable part of video communication. A wide variety of codecs are available, none of which are suitable for all situations.

The first section is devoted to the theoretical study of optical fiber. In the second we studied the video transmission by optical fiber and the different treatments that video undergoes. Finally, the third section was devoted to the simulation of video transmission by optical fiber taking into account: compression, decompression, attenuation and length. And will conclude with a conclusion.

II. OPTICAL FIBER, ITS EVOLUTION AND USE

With the advent of the Internet, bandwidth requirements have become increasingly important in order to convey the growing mass of information on the various networks, with reliability and while maintaining a good quality of service. Indeed, this has required the development of communication systems that are efficient and reliable enough to interconnect a constantly growing number of users around the globe. Researchers and industrialists were able to propagate a deformation-free pulse at the speed of light over very long distances and with a wide bandwidth. The door to the transport of information in optical and binary form was broken and this was the starting point of the race for speed, which led to pharaonic progress in just 20 years [5].

A.Description and evaluation of optical fibers

The fiber is nothing more than fused silica glass filament[6] that can accept electrical signals as an input and convert them into optical signals (light) that are converted back into electrical signals at destination[7].The main element of the fiber is the central conductor called the fiber core or core. This conductor is surrounded by an optical sheath with a refractive index lower than that of the core. The whole will then be covered with a protective coating to mechanically protect the fiber; it plays no role in guiding light (Fig.1). The fiber optic cabling system is based on cabling with an even number of fibers (one for transmission, one for reception) [8].

Adaptive and Personalized e/m-Learning : Approaches and Techniques

Ouissem Benmesbah
LRS Laboratory
Badji Mokhtar University
Annaba-Algeria
ouissa2007@yahoo.fr

Mahnane Lamia
LRS Laboratory
Badji Mokhtar University
Annaba-Algeria
mahnane_lamia@yahoo.fr

Mohamed Hafidi
LRS Laboratory
Badji Mokhtar University
Annaba-Algeria
mhafidi@yahoo.fr

***Abstract*— Adaptive and personalized approaches within e/m learning systems enable adapting learning Objects (LOs) and process to the different needs and contexts, to help the learners in improving their knowledge or skills. In this paper, we review the recent research on learning adaptation to pursue two goals: First is to unify the classification of adaptation types; the second is to study the different approaches and techniques used to implement the learning adaptation in its two main types : adaptation of the LOs selection and adaptation of the LOs sequencing.**

Keywords—Adaptive e/m Learning, Learning path adaptation, Adaptation by selection

I. Introduction

With the rapid development of information technology in education and learning field, researchers have created myriad learning resources. It has been a difficult task for learners to find suitable learning resources from the Internet. Without effective adaptation, irrelevant resources will lead to learners' cognitive overload and affect learning outcomes. Therefore, learning systems need to be adapted to the learners' context and needs.

An adaptive learning environment provides personalized learning resources and processes to the learner through self-directed study. An adaptive learning model can be subdivided basically into a learner model, domain model, and adaptive engine. In such environment, the adaptive e/m learning system should adapt its services to a learner's needs and context. The purpose of adaptation is to optimize the relationship between the learner context and learning content; hence, the learning outcome could be obtained with minimum time and interaction and could also increase the learner satisfaction [1].

Even though academic research on adaptive learning environments has increased, the field lacks a comprehensive literature analysis of the classification of the adaptation types, and the most used approaches and algorithms used to implement every type of adaptation.

This paper presents a study of learning adaptation in e/m learning systems from 2008 up to 2019. It aims to specify:

Rq1- What should be adapted?

Rq2- How it should be adapted?

The rest of this paper is structured as follows: Section 2 describes the main types of learning adaptation. Section 3 collects the most used approaches and algorithms used to implement the adaptation of the learning content and the learning path. Finally, Section 4 presents the conclusion of the work.

II. Overview of the Learning Adaptation Classification

The first research question can be answered by presenting a general classification of adaptation types used in the field of e/m-learning. Several researchers have addressed the adaptation type classification applied in the field of adaptive learning, but these classifications are slightly different. In this section we will study them and propose a new classification.

Sampson [2] identifies three main categories of adaptation related to educational resources within adaptive and personalized learning systems: -Selection Adaptation: This type of adaptation deals with selecting appropriate learning objects LO based on different selection criteria derived from learners' contextual elements. -Presentation Adaptation : considers that LOs is adaptively structured for access via mobile devices by taking into account parameters related to the learners' type of mobile device, the learner's profile (including learner's preferences and learning style), Parameters related with learner's location, physical conditions and learner's temporal information. -Sequencing Adaptation : This type of adaptation rearranges or reorders the navigation and sequencing possibilities of different LOs that are linked to each other towards creating personalized learning paths by taking into account different criteria derived from learners' contextual elements (previous knowledge, availability and current location, Time,…).

Premlatha defines two adaptation types: adaptive presentation at the content level and adaptive navigation support at the link level [1].

El jenati [3] adopts in his work three types of adaptation : -Adaptive content: The adaptation of the content is based on the selection of the adequate pedagogical content which take into account the learner's context. Some learners may wish to get a simple version of the content and others may wish to get a detailed version. - Adaptive navigation: The Adaptive navigation allows to learners to find their paths by adapting the presentation of links to the objectives, knowledge and the preferences of the learner. -Adaptive presentation: The adaptive presentation is to adapt the visual presentation to the preferences and needs of the learner. Some learner can easily read the presented music score and will know how it sounds, but others will want an audio version.

The work presented in [4] focused on various e-learning problems, from these problems, we can extract a set of

Machine learning methods and deep learning for android malware detection using permission

1st MOKRI Miloud Aboubakeur El Sadek
GeCoDe Laboratory, dept. computer sience
Dr.Tahar Moulay University of Saida
Saida, Algeria
bakarmokri20@gmail.com

2nd HAMOU Reda Mohamed
GeCoDe Laboratory, dept. computer sience
Dr.Tahar Moulay University of Saida
Saida, Algeria
hamoureda@yahoo.fr

3rd AMINE Abdelmalek
GeCoDe Laboratory, dept. computer sience
Dr.Tahar Moulay University of Saida
Saida, Algeria
amine_abd1@yahoo.fr

Abstract*— *Android mobile platform has surpassed the other platforms as the most popular, today many important tools and devices have android as her operating system, this superiority has made it vulnerable to many dangerous mobile malware applications. in its rapid growth, programmers looking for solutions more effective to detect android mobile malware and make users data on safety, in this spirit, we present in this paper different approaches to alleviate this problem, we had made a classification of android mobile malware with different algorithms of data mining applied on the android malware dataset (C.Urcuqui and A.Navarro 2016, U.Christian 2016),we had also used a deep learning technique represented by an type of recurrent neural network (the Long short-term memory (LSTM) (Keras 2019), the result obtained by all the algorithms are illustrated and evaluated, after that we had done a finale comparative study of all the results obtained .

Keywords*— *android, mobile, platform, malware, devices, Data mining, deep learning, LSTM, classification.

I. INTRODUCTION

Mobile devices provides greater services than other devices, they have experienced a great development at recent years, which have led to the emergence of the smartphones. Android is the most popular mobile operating system that is installed in millions of devices [4], not only for mobiles, it is an OS also for TVs, Smart watch ...ect. it acquired for more than 50% of smartphone sales in the third quarter of 2011 [5], with more than a billion android-activated devices, and over a billion of monthly-active Android users [6], such as Google Play drive this entire economy of mobile applications. For instance, with more than 50 billion downloaded apps, Google Play has generated revenues exceeding 5 billion USD in 2013 [6], This development was accompanied by negative exploitation represented in the different types of attacks from hackers to spy on users data, hackers are taking the limits of protection techniques and security mechanisms of mobile devices to access to sensitive data by using a malware mobile applications and devices for egg: to steal the user's phone credit, or access to some device functionalities and obtain personal information's like photos, contacts numbers …ect. Recent report also alerts that there is "400 percent increase in android-based malware since summer 2010" [7]. Android platform has the highest malware growth rate by the end of 2011[8], their devices are becoming a target of different type of attacks, as response to those intrusions, the developers has a big challenge against this hackers to guarantee the security of the android devices, a lot of solutions have been proposed to detect any attempt of violation data, the researchers proposed a number of android malware detection systems based on intelligence artificial, or data mining algorithms others prefers deep learning methods because of their high capacity of precision, other apply bio-inspired methods. in our work we had took the dataset android malware detection[1,2], and made classification using some algorithms of data mining[9] , and also deep learning methods, after that we did a comparative study of the results obtained to evaluate and compare and get the best android malware detector.

II. RELATED WORKS

Today android is operating a lot of devices that are used not only in personal life but also on professional life. detect Android malware applications and delete theme is necessary to provide security of confidential information, a lot of researches has been done**,** for egg Justin Sahs presented a machine learning-based system for the detection of malware on Android devices, his system trains a One-Class Support Vector Machine in an offline manner [10], Asaf Shabtai presented a framework for detecting malware on Android mobile devices, his proposed framework realizes a Host-based Malware Detection System that continuously monitors various features and events obtained from the mobile device and then applies Machine Learning anomaly detectors to classify the collected data as benign or malicious[11]. Naser Peiravian proposed to combine permission and API calls and use machine learning methods to detect malicious Android Apps [12]. Zhenlong Yuan proposed a ML-based method that utilizes more than 200 features extracted from both static analysis and dynamic analysis of Android app for malware detection[13]. Gianluca Dini described a Multi-level Anomaly Detector for Android Malware. MADAM concurrently monitors Android at the kernel-level and user-level to detect real malware infections using machine learning techniques to distinguish between standard behaviors and malicious ones [14]. Jaemin Jung proposed a machine learning malware detection methodology that identifies the subset of Android APIs that is effective as features and classifies Android apps as benign or malicious. The proposed methodology first constructs two ranked lists of

Stacked Sparse autoencoder for unsupervised features learning in PanCancer miRNA cancer classification

1st Imene Zenbout
IFA department, NTIC faculty, Constantine 2 University
CRBT, CERIST
Constantine , Algeria
imene.zenbout@univ-constantine2.dz

2nd Abdelkrim Bouramoul
IFA department, NTIC faculty, Constantine 2 University
Misc laboratory
Constantine, Algeria
abdelkrim.bouramoul@univ-constantine2.dz

3rd Souham Meshoul
Princess Nourah bint Abderahmen University
Riyadh, Saudi Arabia
sbmeshoul@pnu.edu.sa

***Abstract*—The recent progress in cancer diagnosis is genomic data analysis oriented. miRNA is playing an important role as cancer biomarkers to move with cancer diagnosis and therapy towards personalized medicine with the ultimate goal to augment survival rate and disease prevention. The recent explosion in genomic data generation has motivated the use of miRNA to enhance diagnosis, prognosis and treatment. In this work we have explored the integrated Atlas PanCancer miRNA profiles, using deep features learning based on unsupervised Stacked Sparse AutoEncoder (SSAE). The proposed SSAE model learns features representation from the used data. The consistency of the learned features has been tested using classification of samples according to 31 cancer types. The model performance has been compared to state-of-the-art unsupervised features learning models. The obtained results exhibit the competitiveness and promising performance of our model, where an accuracy rate of about 95% has been achieved.**

***Index Terms*—Deep learning, Bioinformatics, features learning, Sparse autoencoders, miRNA, PanCancer.**

I. Introduction

The recent and tremendous advance in high sequencing technologies [1] have forstred the role of genomic data across all the transcriptomic as a key answer to different biological related questions and precisely in disease genetics. With these new genomic and genetic data availability and transparency, miRNA role moved from noisy particles to a highly engaged genomic instances in gene regulation and post protein function. This has led to a direct involving of miRNA in the occurrence or the suppression of cancer [2].

microRNA (miRNA) are classified as non-coding regulatory genes [3], that can be found in small fragments of non-coding RNA regions (about 21-23 nucleotide) [3], [4]. Since the discovery of miRNA in 1993 by R.C.Lee [5], the generation of miRNA data using high throughput technologies [6], [7] to explore the direct role of miRNA and cancer diagnosis and gene impact become intensive. The particularity of miRNA profiles is their ability to be a direct tool in cancer analysis, therapy and post treatment [8], which represents the main motivation of this work. The miRNA data share the same issue with gene expression data which is the very small sample size with regard to the high profiles dimensionality .i.e there is some profiles that are irrelevant in cancer diagnosis and related decisions compared to the low number of patient samples. Obviously, this lends itself to a dimensionality reduction problem where it is required to extract the miRNA signature representation that can be a relevant predictors in cancer diagnosis.

In this work we propose a deep unsupervised features learning model, based on stacking three sparse autoencoders to learn new features from the initial noisy miRNA profiles inputs. The learned features through the different abstraction levels, have been used to train classifiers to predict the cancer type of a specific sample according to 31 different cancer type. The proposed unsupervised and supervised models have been trained on the Atlas PanCancer [9] data set. The particularity of this data set is that it combines different cancer type. This may help us to draw information from the well explored cancer type that have a big number of samples and/or a high correlation between the different miRNA profiles and apply these information to classify, or understand the cancer type with poor exploration rate. The features learning model has been compared to some of the most known unsupervised features learning and dimensionality reduction models, here we used pricipal component analysis PCA and kernel principle component analysis KPCA. The rest of the paper is organized as follows: A literature review in section II. Section III is devoted to a brief introduction to sparse autoencoders. Section IV describes the data set and the preprocessing steps. Our proposal is presented in section V along with the set of experimental results and discussion.

A hybrid chemical reaction optimisation algorithm for solving the DNA fragment assembly problem

1st Naima Saidi
MISC Laboratory
Constantine 2 University
Constantine, Algeria
naima.saidi@univ-constantine2.dz

2nd Abdesslem Layeb
MISC Laboratory
Constantine 2 University
Constantine, Algeria
layeb.univ@gmail.com

***Abstract*—The DNA Fragment Assembly Problem (FAP) is a combinational optimisation problem in bioinformatics which is the process of reconstructing the original DNA sequence from a set of fragments produced by a sequencing machine. It is an NP-Hard problem. Therefore, finding an exact solution in a polynomial-time is impossible. Metaheuristics-based algorithms can be used to provide a good solution in reasonable time. In this paper, we have applied a Chemical Reaction Optimisation (CRO) algorithm combined with Simulated Annealing (SA) to the DNA fragment assembly problem. The experimental results showed that CRO+SA is very competitive with the state-of-the-art algorithms for this problem.**

***Index Terms*—Bioinformatics, DNA Fragment Assembly Problem, Chemical Reaction Optimisation, Simulated Annealing**

I. Introduction

The deoxyribonucleic acid (DNA) is a double stranded helix that contains genetic information needed for the development and functioning of almost all cells in a living organism. Each strand is constructed from four types of nucleotides: Adenine, Cytosine, Guanine, and Thymine. To determine the sequence of these nucleotides, the process of DNA sequencing is applied. Since current DNA sequencing technologies are not able to read the whole DNA sequence, only much shorter fragments called "reads", the DNA fragment assembly is needed to reconstruct the original DNA sequence from these reads.

The process of DNA sequencing starts with duplicating the original DNA sequence, then each copy is cut into short fragments at random points. After that, this biological material is converted to sequences of Ts, Gs, Cs, and As using a sequencing machine; this process is referred to as the shot-gun sequencing. After the reads are obtained, an assembly approach is followed to merge these reads into a longer DNA sequence.

The main approaches to the DNA fragment assembly problem are: the Overlap-Layout-Consensus (OLC) which is especially used for assembling long reads obtained by the Sanger sequencing or the third generation sequencing, and the De Brujin graph [1], this approach became popular for assembling the short reads produced by the next generation sequencing.

Unfortunately, the DNA fragment assembly is an NP-Hard problem [2], even with the elimination of sequencing errors and the difficulties caused by the repetitive structure of genomes. Therefore, metaheuristic approaches are employed to find good solutions efficiently. Chemical reaction optimization (CRO) is a powerful population-based optimization algorithm proposed by [3]. It mimics what happens to molecules in a chemical reaction system microscopically. The CRO is a discrete metaheuristic which made it suitable for the DNA fragment assembly problem. It has been successfully applied for several combinatorial and real world optimization problems such as : task scheduling in grid computing [4], the 01 knapsack problem [5], max flow problem [6], the vehicle routing problem [7], the energy conserving of sensor nodes in the design of wireless sensor networks [8], clustering algorithms for wireless sensor networks [9], and multiple sequence alignment [10].

In this paper, a chemical reaction optimization algorithm combined with a simulated annealing-based local search has been proposed to solve the DNA FAP. The simulated annealing-based local search have been used to enhance the final solution obtained by the CRO algorithm. We have validated our algorithm by using three set of benchmarks: Genfrag, Dnagen, and the f-seires. The experimental results show that the algorithm can get better overlap score than other metaheuristics-based approach.

The remainder of this paper is organized as follows. In section II, we give some basic concepts about the DNA fragment assembly problem. Section III presents the CRO algorithm. The manner of applying the CRO+SA on the DNA fragment assembly problem is detailed in section IV. Section V presents and discusses the experimental results obtained from applying the proposed approach on three set of benchmarks. Finally, Section VI concludes the paper.

II. The DNA fragments assembly problem

The DNA fragments assembly is one of the most difficult phases of any DNA sequencing project. Due to the fact that long DNA sequence cannot be accurately and rapidly sequenced. DNA sequencing provides the necessary information about the overlap to combine the reads back together. Therefore, the ultimate goal is to obtain a sequence as close as possible to the original one [11].

Training feedforward neural networks using hybrid particle swarm optimization, Multi-Verse Optimization

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1st Rabab Bousmaha
GeCoDe Laboratory
Department of Computer Science
University of Saida
Saida, Algeria
Rabab.bousmaha@gmail.com

2nd Reda Mohamed Hamou
GeCoDe Laboratory
Department of Computer Science
University of Saida
Saida, Algeria
hamoureda@yahoo.fr

3rd Amine Abdelmalek
GeCoDe Laboratory
Department of Computer Science
University of Saida
Saida, Algeria
amineabd1@yahoo.fr

***Abstract*—The learning process of artificial neural networks is an important and complex task in the supervised learning field. The main difficulty of training a neural network is the process of fine-tuning the best set of control parameters in terms of weight and bias. This paper presents a new training method based on hybrid particle swarm optimization with Multi-Verse Optimization (PMVO) to train the feedforward neural networks. The hybrid algorithm is utilized to search better in solution space which proves its efficiency in reducing the problems of trapping in local minima. The performance of the proposed approach was compared with five evolutionary techniques and the standard momentum backpropagation and adaptive learning rate. The comparison was benchmarked and evaluated using six bio-medical datasets. The results of the comparative study show that PMVO outperformed other training methods in most datasets and can be an alternative to other training methods.**

***Index Terms*—Particle swarm optimization, Multi-Verse Optimization, Training feedforward neural networks, Real world Datasets**

I. Introduction

Artificial neural network (ANN) is one of the most important data mining techniques. It has been successfully applied to many fields. The feedforward multilayer perceptron (MLP) is one of the best-known neural networks. The multilayer perceptron (MLP) consists of three layers composed of neurons organized into input, output and hidden layers. The success of an MLP generally depends on the training process that is determined by training algorithms. The objective of the training algorithms is to find the best connection between weights and biases that minimize the classification error. Training algorithms can be classified into two classes: gradient-based and stochastic search methods. Backpropagation (BP) and its variants are gradient-based methods and considered as one of the most popular techniques used to train the MLP neural network. Gradient-based methods have many drawbacks, such as the slow convergence, the high dependency on the initial value of weights and biases and the tendency to be trapped in local minima [1].To address these problems, stochastic search methods, such as metaheuristics have been proposed as alternative methods for training feedforward neural network. Metaheuristics have many advantages: they apply to any type of ANN with any activation function [2], are particularly useful for dealing with large complex problems that generate many local optima [3] [4]. Genetic algorithm (GA) and Particle Swarm Optimization (PSO) considered as the most well-known nature inspired MLP trainers. Montana and Davis proposed one of the earliest works on training the feedforward neural network (FFNN) with GA [22]. They showed that GA outperform BP when solving real problems.Slowik and Bialko [23] employed Differential Evolution (DE) for training MLP and showed that it has promising performance compared to BP and Levenberg-Marquardt methods.

Others metaheuristics algorithms have been applied in training feedforward MLP, such as the modified BAT [5], Multi-Verse Optimization MVO [6], Whale Optimization Algorithm (WOA) [7], Grey Wolf Optimizer (GWO) [8] [9], Biogeography Based on Optimizer (BBO) [10], Moth-Flame Optimization (MFO) [11] and Improved Monarch Butterfly Optimization (IMBO) [12]. Furthermore, several hybrid algorithms have been proposed to train a neural network. Tarkhaneh and Shen [13] suggested a hybrid approach to neural network training by combining PSO, Mantegna Levy flight and neighbor search (LPSONS). The comparison experiments showed that the proposed algorithm can find optimal results. Khan et al [14] introduced a new method based on two algorithms, accelerated particle swarm optimization (APSO) and cuckoo search (CS), named HACPSO. The comparison results demonstrated that the proposed algorithm outperforms other algorithms in term of accuracy, MSE and standard deviation. This paper presents a new training approach based on hybrid particle swarm optimization (PSO) with Multi-Verse Optimization (MVO), called PMVO, to train the feedforward neural network (FFNN). Six

Credit Card Fraud Detection for E-commerce transactions using LSTM

1st BEN SAID Tayeb
GeCoDe Laboratory ,dept.computer science
Dr.Tahar MOULAY University of Saida
Saida, Algeria
tayeb.islame20@gmail.com

2nd AMINE Abdelmalek
GeCoDe Laboratory ,dept.computer science
Dr.Tahar MOULAY University of Saida
Saida, Algeria
amine_abd1@yahoo.fr

3rd HAMOU Reda
GeCoDe Laboratory ,dept.computer science
Dr.Tahar MOULAY University of Saida
Saida, Algeria
hamoureda@yahoo.fr

***Abstract*— Electronic payment is considered as the fastest way of payment in the buying and selling operations (shopping) as well as the payment of contributions Whether it is from home, office or any place using various devices. Nevertheless, there are some misconduct that cause huge financial losses for customers using fraudulent credit cards that are undetected by some systems. Which leads to an inconvenience for users, In this paper one of the most complex techniques known as deep learning has been used, especially Long Short Term Memory (LSTM) variant of the recursive neural network RNN to classify electronic credit cards. Unlike traditional classifiers this technique is distinguished by its ability to learn. Concerning the classification by LSTM a set of information about the card is taken including time and amount using the body of the Kaggle, The results are presented in several measures including accuracy and F-measure. The results proved that LSTM has given a very satisfactory results using the findings from different works.**

Keywords*— *Classification, fraud detection, credit-card, long short-term memory, deep-learning

I. INTRODUCTION

With the big move of the global economic entity from dealing in cash to credit card transactions, which is a plastic card carrying a set of information such as full name, account number, expiration date and company logo[3], the card also holds an electronic chip that allows it to be used in electronic payment devices, and can be recharged with money and used for direct purchase or online and has become more common in everyday life, as shown in Fig 1.

Fig. 1. Template credit card. [17]

However, the use of these cards is not without risks. Illegal transactions may occur at the expense of one person by another person making purchases or transfers without the knowledge of the cardholder by stealing one or more credit card information, what is considered to be theft and infringement of privacy, and therefore developed several systems to detect these frauds to reduce the losses of dealers. Fraud rates soared dramatically as online sales grew where the UK card fraud totaled £ 671.4 million in 2018, or 19 percent , An increase from £ 565.4 million in 2017.At the same time, total spending on all debit and credit cards amounted to £ 800 billion in 2018, with 20.4 billion transactions made during the year. [18] What distinguishes these scammers is the constantly changing strategy and the low percentage of fraud compared to the original transactions, which makes it difficult for systems and investigators to detect fraudulent transactions, this has led to the adoption of these systems on learning algorithms, which in turn suffered from the difficulty of retaining most of the assumptions in the fraud detection system, which is a lack of realism. Credit card fraud detection is a fairly mature area of research, prompting researchers to try to develop fraud detection systems to gain access to the system capable of accurately detecting unwanted transactions. Most of the previous work in this field relied on traditional machine learning classifiers that rely on features manually extracted from training data.

In this paper we propose one of the most advanced techniques in the field of classification called deep learning, generally designed in the form of two external layers (input layer and output layer) within which one or several hidden layers, and the recurrent neural network RNN is one of the most effective deep learning techniques, The research will be modelled as a new enhanced prototype named Long Short Term Memory (LSTM) which can successfully identify fake credit cards. What distinguishes LSTM from the normal neural network is the presence of additional subjective loops that help retain the wrong information as well as pass it to the next layer with a large number of hidden layers or processing layers. The LSTM data retention feature gives it the ability to choose which information to store, which should be ignored and which should be transferred to the adjacent layer. Unlike ordinary neural networks that lack this characteristic as each layer is unique treatment without resorting to the adjacent layers.

Experiments are conducted on a set of transaction data made using the credit cards available at Kaggel, which are extracted from European cardholders' transactions[18]. Our research examines the adaptation of fraudulent workbooks by training on fraudulent transactions and then publishing the trainer model to detect fraud in our selection.

II. BACKGROUND AND RELATED WORK

Since the advent of credit cards a lot of works and research seek to solve the problem of fraud in these cards, some of them resorted to the use of machine learning classification techniques were initially acceptable results[7], others resorted to the use of combining traditional Algorithms of classification with other classifiers , like a boosting between traditional classifiers with bio-inspiration algorithms like ABC algorithm with KNN This combination gave good results from the results of merge traditional

LISP(P) : A new pedagogical approach for learning mathematics in Colleges

Yacine Lafifi
LabSTIC Laboratory
Université 8 Mai 1945 Guelma
Guelma, Algeria
lafifi.yacine@univ-guelma.dz

Rochdi Boudjehehm
LabSTIC Laboratory
Université 8 Mai 1945
Guelma, Algeria
rochdiboudjehem@gmail.com
boudjehem.rochdi@univ-guelma.dz

Rim Benoughiden
Université 8 Mai 1945
Guelma, Algeria
benoughidenerym@gmail.com

Zahra Mehnaoui
LabSTIC Laboratory
Université 8 Mai 1945
Guelma, Algeria
mehnaoui.zahra@univ-guelma.dz

***Abstract*—The education level of any given nation is a major indicator of its progress and well-being. Developed countries are always elaborating new curricula and integrating them into modern technological forms in order to make the learning process much more easier. Following these countries footsteps, underdeveloped countries are trying to do the same and Algeria is one of them.**

In Algeria, and according to statistics published by the Ministry of National Education regarding the level of students in term of languages and mathematics, results are not very cheerful. Lot of reasons can be behind these results, some of them are of pedagogical nature such as teaching techniques, others can be technical like the teacher's training.

The aim of our work is to provide teachers and students with more modern tools that can make the learning process a much more pleasant experience for both of them, and this can be achieved by taking advantage of the rapid and progressive development of information and communication technologies (ICT).

Our proposed educational approach is called LISPP (Learn, Imagine, Select, Practice, Play). This approach has been implemented in a platform called M2M (Mathematics for 2nd year Middle), a straightforward interface, that attracts students to learn mathematics in a funny and non-intimidating way.

In order to assess the students progress, the system make them passe collaborative as well as individual tests before letting them reach the final level.

***Index Terms*—collaborative learning, self-assessment, collaborative assessment, mathematics learning, serious game, e-learning, distance education, middle school, Algeria, ICT**

I. Introduction

Basic mathematics are among the most important skills that a person must possess and master; not only for his academic success, but also for the success of management of his daily living and economic activities [1]–[4]. Mathematics research is about learners' ability to analyze, reason and communicate effectively as they pose, solve and interpret mathematical problems in a variety of situations [5].

In all over the world, mathematics should be learned from the earliest ages and continued up to university, where it is fundamental to other disciplines such as computer science, electronics, physics, chemistry, finance, etc.. Therefore, it is a highly required part of the curriculum of any student at any university.

Unfortunately, learning mathematics doesn't seem to be an easy task for many learners [6].

According to Chiappini [7], one of the reasons that makes the learning of mathematical concepts difficult is that some of these concepts like numbers or functions are not intuitive and not practicable through everyday experiences.

Our field study revealed other reasons for having low or unacceptable results in mathematics.

- Failure to manage several pieces of information at the same time.
- Failure to remember relationships.
- Inability to apply mathematical rules and standards.
- Lack of organization.
- Failure to follow instructions.
- Failure to understand what is required of them when solving problems and exercises.
- Confusion in their thoughts

For all the above reasons, we had the idea to contribute to national efforts to improve the level of mathematics among Algerian students and thus positively change their vision on this subject by taking advantage of the many benefits of information and communication technologies on the one hand, and the passion of these students towards Smartphones and tablets on the other one.

We first began our work by conducting a field study so that

A new approach for arrhythmia classification using stacked autoencoders and multilayer perceptron

Roguia Siouda
Department of computer sciences
University of 8 Mai 1945
Guelma, Algeria
siouda.roguia@univ-guelma.dz

Mohamed Nemissi
Department of Electronics and telecommunications
University of 8 Mai 1945
Guelma, Algeria
nemissi.mohamed@univ-guelma.dz

Hamid Seridi
Department of computer sciences
University of 8 Mai 1945
Guelma, Algeria
seridi.hamid@univ-guelma.dz

Muhammet Kurulay
Department of computer science
Yildiz Technical University
Istanbul, Turkey
mkurulay@yildiz.edu.tr

***Abstract*— The Electrocardiogram (ECG) is a popular and powerful diagnostic technique for examining heart function and classifying abnormal arrhythmias. In this paper, we propose a system for classifying ECG beats based on stacked sparse auto encoders (SSAEs) and multilayer perceptron (MLP). The SSAEs are employed to extract high level features from raw ECG signals, then the obtained features are presented to the MLP. The proposed system aims at discriminating five different categories of irregular heart rhythms. To evaluate the proposed system, we conduct experiments on MIT–BIH arrhythmia database and compare the obtained results with some of the state-of-the-art methods. In addition, we analyze the effect of the number of the stacked auto-encoders and the number of the features on the reconstruction performance and the classification accuracy.**

Keywords—stacked sparse auto-encoders, ECG arrhythmia classification, feature extraction, multilayer perceptron, MIT-BIH database

I. INTRODUCTION

Despite recent progress, cardiovascular diseases are still among the main causes of death all over the world. An appropriate examination of the ECG constitutes an important tool for detecting cardiac arrhythmias specially in long-time recordings. The computer-aided systems provide significant solutions that can help cardiologists in the diagnosis. Consequently, various methods have been proposed to automatically analyze the ECG signals. These methods generally include three main steps: pre-processing, feature extraction and classification. However, the non-linear and non-stationary nature of these signals and the noise affecting them constitute an obstacle to designing successful systems.

Recently, deep learning approaches, which perform both feature extraction and classification tasks, have shown their effectiveness in various field. Among these methods, the sparse autoencoders [1][2][3] have been used in several methods for ECG signals classification. For example, Ozal Yildirim et al. [4] proposed a deep approach for the recognition of arrhythmic heartbeats. First, the convolutional auto-encoder (CAE) method is used to compress the ECG beats and obtain low-dimensional signals for each beat. Second, A long-short term memory (LSTM) network model is constructed to classify the coded signals. Jianli Yang et al. [5] presented an ECG arrhythmia classification method based on stacked sparse autoencoders (SSAEs) and SoftMax regression (SF) model. The SSAEs are employed to hierarchically extract high level features from huge amount of ECG data. The SF is then trained to serve as a classifier for discriminating six different types of arrhythmia heartbeats. M.M. Al Rahhal et al. [6] proposed an approach based on deep learning for the active classification of ECG signals. This approach includes two phases: First, a suitable feature representation from raw ECG data is automatically learned using stacked denoising autoencoders (SDAEs). Then, SoftMax regression layer is added on the top of the resulting hidden representation layer yielding the so-called deep neural network (DNN). Finally, an active learning (AL) criteria for selecting the most valuable ECG beats is applied to update the DNN weights. Ozal Yildirim et al. [7] designed a deep network structure that consists of 27 layers, including coders and decoders, to compress the ECG signals. The deep convolutional autoencoder (CAE) provides a representation of the low and high levels of signals in the hidden layers of the system. Therefore, the original signal can be reconstructed with minimal loss. The method proposed by [8] uses deep bidirectional long-short term memory network (LSTM) based on wavelet sequences (DBLSTM-WS) for the classification of electrocardiogram (ECG) signals. The wavelet-based layer is implemented to generate ECG signal sequences.

The ECG signals are decomposed into sub-bands of frequencies at different levels in this layer. These sub bands are used as input sequences for the LSTM networks. Yinsheng Ji et al. [9] used faster regions with a convolution neural network algorithm (Faster R-CNN) to classify the ECG beats. In this approach, each beat of the ECG signal is transformed into a two-dimensional image for both experimental learning and test sets.

In this paper, we propose a classification system for ECG beats based on stacked sparse auto encoders (SSAEs). The high-level features obtained from SSAEs are presented to multilayer perceptron (MLP). We analyze the effect of the number of the stacked auto-encoders and the number of the obtained features on the reconstruction performance and the classification accuracy. For the evaluation, we use the well-known MIT–BIH arrhythmia database and we apply the recommendations of the Association for the Advancement of Medical Instrumentation (AAMI), which defines five classes of interest: normal (N), ventricular (V), supraventricular (S), fusion of normal and ventricular (F) and unknown beats (Q).

Geometrical Characterization of Wide Stitched Jute Fabric using Image Processing technique

***Abstract*—The use of materials in human's life is as old as time for clothing, housing and hunting. During his search for better characteristics of materials than those traditionally used in techniques, men invented the group of materials referred to as composites which are considered as the best materials meeting the requirements that other materials can hardly achieve.**

Carbon, aramid and glass fibers are, by far, dominating the reinforcement of composite materials. However, due to the global increasing environmental protection consciousness and knowledge of health hazards associated with the manufacture and use of some synthetic fibers, plant based reinforcement have been presented as a good replacement for conventional synthetic fibers for applications requiring high strength to weight ratio, further weight reduction and green character which can save our future generation.

An understanding at the fabric level of composite materials is crucial for a good fabric/matrix compatibility and for an effective use in various applications. These geometrical parameters should be determined before the use of natural 2D fabric as reinforcement of polymer matrix based composite materials. For this end, there are two main procedures; Empirical methods consisting of visual and tactile inspections relying strictly on the human eye or the recourse to numerous trials' types with all the labor, time and cost associated. In order to minimize time, labor, and economize money, computer based techniques were introduced in the textile field.

In the present study, we are trying to make a contribution to the determination of jute vegetal fabric's geometrical characteristics by applying the digital image processing while avoiding wastage of material and, all at once, without invoking expensive tools unavailable in Algeria. For the best knowledge of the authors, the aimed purpose of this research paper was not published elsewhere. The studied parameters are; fabric cover factor, yarns count, yarn's cross-sectional area; fabric thickness, yarns spacing, hairiness, and indirectly fabric mass per unit area.

The numerical obtained values are in a good correlation with the experimental compaign carried out simultaneously in order to achieve an acceptable validation of the results.

Keywords— image processing, composite materials, Jute Fabric, geometrical parameters.

I. INTRODUCTION

The use of materials in human's life is as old as time for clothing, housing and hunting. Along centuries, during his search for better methods and more comfortable life, men invented new materials fulfilling his diversified daily needs ranging from woods and cut stones to metals. The search for better characteristics of materials than those traditionally designed and used in techniques (metals, bricks, timbers, ceramics, etc.) resulted in creating the group of materials referred to as composites. The composites are, if well designed, the best materials meeting the requirements of lightweight, price/performance ratio, reduced time of manufacture and implementation and operating conditions [1]. That is why they are nowadays a rapidly expanding field linking issues of textiles, metallurgy, mechanics and polymer chemistry as well as plastics processing [2]. Composite materials reinforced with woven fabrics are becoming increasingly popular in various structural appliactions from automotive, aerospace, furniture, and so on. Without fiber reinforced composites, modern aircraft production would not be possible, and in the house and road-building industries, fibers and textiles are increasingly being used [3].

Fiber reinforced composites fulfil the criteria that other materials can hardly achieve low density, stiff adjustable attenuation, good thermal expansion that reduces the direction of the fibers, increased stability to vibration and they may readily be constructed in modular form [4]. The main advantages of woven composites are their good stability, cost efficiency and high processability, improved machinability, and, in particular, the use of a wide range of textile strcutures particularly in lay-up manufacturing of large-scale structures. At the same time, bending of fibres in the process of fabric weaving results in substantial reduction of material strength and stiffness [5]. The woven structures provide a combination of strength with flexibility. The structure and properties of a woven fabric are dependent upon the constructional parameters as thread density, yarn fineness, crimp, weave thichness and cover factor [6].

Carbon, aramid and glass fibers are, by far, dominating the reinforcement of composite materials. However, due to the global increasing environmental protection consciousness and knowledge of health hazards associated with the manufacture and use of some synthetic fibers [7], plant based reinforcement have been presented as a good replacement for conventional synthetic fibers for applications requiring high strength to weight ratio, further weight reduction and green character. Emphasizing the green technology in manufacturing process with proper materials selection of natural fibre reinforced composite (NFRC) can save our future generation [8].

In recent years, plant fiber-reinforced thermosseting resin- based 'green' composites have got great attention and are finding increasing applications in composites as they enable us to easily fabricate lightweight strcutural components at affrodable cost from eco-friendly renewable resources leading to a construction material endowed with lower density and manufcture cost, biodegradability, abaundant availability,

A genetic approach wrapped Support vector machine for feature selection applied to Parkinson's disease diagnosis *

1st Bouslah Ayoub
Computer Science Department
(of Badji Mokhtar University)
Annaba, Algeria
email ic.bouslah@gmail.com

2nd Taleb Nora
Computer Science Department
(of Badji Mokhtar University)
Annaba, Algeria
email talebnr@hotmail.fr

ABSTRACT—Parkinson's disease (PD) is found to be a challenging issue which can offer a computerized estimate about classification of PD to patient people and healthy normal people. Due to the importance of that problem, several types of biomedical data can be analyzed to accurately detect PD by using different learning methods. This work considers the diagnosis of PD based on voice data by using non-linear support vector machine (SVM). However SVM is known as the one of the fast and accurate learning methods, selection of relevant feature elements of PD dataset can be effective on improving the classification performance of SVM. To this end, this paper proposed an SVM in parallel with GA based feature reduction model for selecting the most relevant features to get Parkinson's disease. Evaluation of the proposed method on PD dataset proves the superiority of the proposed method on the problem of PD classification, in comparison to the other learning methods and feature selection algorithms.

Keywords—Parkinson's disease (PD), Feature selection, Genetic algorithm (GA), Classification, Support Vector Machine (SVM).

I. INTRODUCTION

Parkinson's disease is the second most neuron destructive disease after Alzheimer's disease. Although its underlying cause is unknown, the symptoms associated with PD may be significantly lessened if they are detected in the early stages of the disease [1, 2]. PD is characterized by tremors, rigidity, slow motion, asymmetry of motor symptoms and impaired posture [3, 4]. A person with Parkinson's will progressively lose their physical abilities and become worse if there is no health care or appropriate solution. This disease occurs in all races and spreads in one to two individuals in a thousand. Its spread increases with age. It has been estimated that around 40% of people with this disease may not be diagnosed [5]. In recent years, the efforts to understand and characterize PD have intensified, a number of data mining and machine learning algorithms are developed to predict the early stage of Parkinson's disease from biomedical data using voice, gait, and wearable sensors [6, 7, and 8]. Voice signal recording is the earliest, easiest and non-invasive technique for diagnosis of PD [9]. As most people with PD suffer from speech disorders [10], it could be considered a very reasonable way for detecting PD [11, 12]. In many cases, data mining and machine learning algorithms are used on a very large scale of Parkinson's disease data [13, 14]. This would create high computational complexity and lower efficiency. In order to overcome this problem, a range of feature selection algorithms are developed to identify the most significant features for predicting Parkinson's disease [15, 16]. The most recent attempts at diagnostic improvement consider the feature selection of the voice data set as in Kaya et al. (2011) [17] and A. Tsanas et al. (2012) [18], the classification methods as in Sakar (2013) [19] and M. Can (2013) [20] or both of them as in (K. Shahsavari et al., 2016; S. Yang et al, 2018) [21, 22]. The results show that feature selection process is very important to improve diagnostic accuracy. Subsequently, this paper presents an attempt to improve the diagnosis of Parkinson's disease. The main contributions of this work are proposing a new genetic algorithm based feature selection coupled with SVM in the Parkinson's diagnosis problem. In addition, we present a comparison of various types of feature selection algorithms. More generally, feature selection algorithms are classified into the following types, information gain, T-test, CFS, RFS (R-value), relief, MRMR because they are fast and efficient [23]. In addition, genetic algorithms are inductive. Adaptive random search techniques make it possible to exploit information accumulated on an unknown search space and then search for promising new subspaces [24]. Finally, the SVM-based RFE-CBR is a wrapper feature selection algorithm that uses criteria derived from the coefficients in original SVM models to assess features. It recursively removes features that are not informative. Compared to other wrapper techniques, SVM-based RFE-CBR does not use the precision of cross-validation on the training set as a selection criterion. As a result, it is less subject to overfitting and remains fast even though the original feature set is large [25]. The remainder of the paper is organized in the following manner. Section 2 contains related work. Section 3 introduces the methodology. Section 4 presents the data and the efficiency of our method is compared to other learning method and various algorithms for selecting relevant features. And finally the conclusion of the work.

II. RELATED WORK

Using the speech samples for the diagnosis of PD has been the subject of several investigations. For instance, Shahbaba et al. (2009) [26] used a non-linear model based on Dirichlet mixtures for the diagnosis of PD. An 87.7% classification accuracy was obtained with this method. Little et al. (2009) [27] conducted a remarkable study about PD identification, they employed a Support Vector Machine (SVM) classifier with Gaussian radial basis kernel functions to predict PD, and also performed feature selection to select the optimal subset of features from the whole feature space, and the best accuracy rate of 91.4% was obtained by the best model. Das (2010) [28] carried out a comparative study of artificial neural networks (ANN), DMneural, regression and decision trees for the diagnosis of the PD using speech samples. The experimental results showed that the ANN method achieved a 92.9% general classification performance. Guo et al. (2010) [29] proposed a hybrid model based on expectation maximization (EM) and a genetic algorithm (GA), and obtained 93.1% classification accuracy. Ozcift and Gulten (2011) [30] combined the CFS (correlation based feature

Using a bio inspired approach to improve UAVs vision coverage

1st Nebili Wafa
LabSTIC Laboratory
8 Mai 1945 Guelma University
Guelma, Algeria
nebili.wafa@univ-guelma.dz

2nd Benrazek Ala-Eddine
LabSTIC Laboratory
8 Mai 1945 Guelma University
Guelma, Algeria
benrazek.alaeddine@univ-guelma.dz

3th Farou Brahim
LabSTIC Laboratory
8 Mai 1945 Guelma University
Guelma, Algeria
farou.brahim@univ-guelma.dz

4rd Kurulay Muhammet
Mathematical Engineering Department
Yildiz Technical University
Istanbul, Turkey
mkurulay@yildiz.edu.tr

5th Ferrag Mohamed Amine
LabSTIC Laboratory
8 Mai 1945 Guelma University
Guelma, Algeria
ferrag.mohamedamine@univ-guelma.dz

***Abstract*—In order to improve safety and security in the public areas, researchers are setting up several smart cameras such Unmanned Aerial Vehicles UAVs (also called drones) in major cities. Faced to this growing number of cameras, the covering and the tracking of disasters without a monitoring process of the cameras become very difficult task for human operators. In this paper, a new process for monitoring the camera in the disasters based on Grey Wolf Optimizer technique was proposed. This strategy changes the position of the drones with Grey Wolf Optimizer for reorienting their fields of view (FoV) to adjust them and to give a better vision of the scenes. Our method is simulated with a describe scenarios of accident. The stimulation results demonstrate the effectiveness of our proposition to solve cover scenes problem.**

***Index Terms*—Multi-UAV (Drones), Swarm Intelligence, Grey Wolf Optimizer, Fields Of View (FoV), Vision Rate.**

I. Introduction

With the development of information and communication technology (ICT) and the micro-electro-mechanical system (MEMS) sensors, the small UAVs become an efficient tools for many smart city applications such as: precision agriculture [1], [2], security and surveillance [3]–[5], environmental and natural disaster monitoring [6], [7], search and rescue missions [8], [9], and goods delivery [10]–[12].

Unmanned Aerial Vehicles - UAVs or drones are a flying objects that don't have a pilot on board (no humans on board). Each drone have a processing capacity and it equipped with a sensor (camera) which allows an easy deployment, high mobility and a wide field of view [13], [14]. Since there are no humans on board, drones can be easily submitted in the dangerous missions without casualties [15]. The drones are grouped in a swarms or teams, each UAV in the team is communicate with the other drones and being commonly controlled from a ground station (centralized system) or by using an autonomous embedded control algorithm (distributed system) [16].

In the literature, there exists many research works that deals the problems of : target search, localization, and tracking in the UAVs systems. From this works, we find Meng et al. [17] which used geometric relationships (relative position, orientations, speed ratio, and minimum turning radius) to generate an optimal trajectory for autonomous target tracking. Wang et al. [18] proposed a novel strategy for tracking ground moving objects in complex urban environments with a multiple drones using a hybridization of the receding horizon control principle and chemical reaction optimization framework. Brust et al. [19] presented in our article a hybridization approach that combine a multi-hop clustering (k-Hop Clustering), a dual-pheromone and the Ant Colony Optimization (ACO) to provide an optimal solution for target detection and tracking, improve map coverage and to stabilize network connectivity. Clustering is used to keep the network topologies stable in the other hand the dual-pheromone allows to identify and mark the targets detected and the areas visited. To improve the tracking process of multi-UAVs in the urban environment, Yao et al. [20] proposed a new method that combines the Model Predictive Control (MPC) and Improved Grey Wolf Optimizer (IGWO) to solve the trajectory optimization problem. Authors of this article used the centralized MPC method to predict the future trajectories of UAVs and they proposed an improvement of the standard GWO to solve the model predictive control.

In the context of improving disaster detection systems, Ghamry et al. [21], proposed an algorithm to train the flight of an UAV optimally for detecting forest fires. This algorithm is based on auctions to assign the UAV at each firing point, for this purpose, authors used PSO algorithm and

Speech emotion recognition using MFCC features: application in e-learning environements

Adil Boughida
LabSTIC Laboratoty
University 8 may 1945 of Guelma
Algeria
adelfr@gmail.com

Mohamed Nadjib KOUAHLA
LabSTIC Laboratoty
University 8 may 1945 of Guelma
Algeria
kouahla.nadjib@yahoo.fr

Imed CHEBATA
Computer science departement
University 8 may 1945 of Guelma
Algeria
kouahla.nadjib@yahoo.fr

***Abstract*— In this paper, we try to detect the emotion based on sound. For this, we use the MFCC algorithm to extract useful sound *features*. These *features* are extracted from the speech signal. Then they will be used to build an emotion classification model with SVM. The results of the experiment on datasets EMO-DB and RAVDESS shows that the proposed method allows to achieve a great performance of detection of human emotion based on sound.**

Keywords*— *speech signal, emotion recognition, MFCC, Support vector machine

I. INTRODUCTION

The role of emotions is important in how we think and behave. The emotions we feel every day can force us to act and influence the decisions we make about our lives, big and small. The purpose of the emotion recognition system is to enable human-machine interaction. Emotional expressions can be transmitted verbally or as body language. In this paper, we try to find the best features and classifier that are more robust in the context of sound-based emotion recognition.

The recognition of vocal emotions is essentially achieved by pure sound processing without linguistic information. In terms of acoustics, speech processing techniques offer valuable information derived primarily from prosodic and spectral features. After, sound processing and acquisition of features, it is quite common to follow a selection of features in the search for sound features [1].

Several speech features have been successfully applied for the recognition of speech emotions and these have been classified into four main groups: continuous features, qualitative features, spectral features and nonlinear features.

In this paper, we propose a novel approach based on a speech for emotion recognition. The rest of the paper is organized as follows: Section 2, related works. Section 3 gives an overview of some definition. Section 4 describes design of the proposed system. Section 5 discusses our results. Finally, Section 6 concludes the paper.

II. RELATED WORKS

Different types of features and classifiers have been proposed for the vocal emotion recognition, such as Hidden Markov Model (HMM), the Gaussian Mixture Model (GMM), Support Vector Machine (SVM) and Artificial Neural Network. (ANN). In what follows, we describe some recently published works in the field of vocal emotion recognition.

Neumann et al. [2] propose attention-based convolutional neural network (ACNN), associating CNN and attention. The group has experimented with four different sets of input features, namely 26 logMel filter banks, 13 MFCCs, a set of prosodic features and Geneva Minimalistic Acoustic Parameter Set (eGeMAPS) [3].

Alonso and his colleagues used prosodic features as well as paralinguistic features to detect emotions; an accuracy of about 95% was obtained using the EMO-DB database [4].

Haytham, margaret and lawrence proposed a deep learning framework in the form of convolutional neural networks (CNNs), where the input was the spectrogram of the speech signal. They reached an accuracy of 64.78% in the IEMOCAP Database [5].

P. Giannoulis and G. Potamianos used prosodic, spectral, glottal flow and AM-FM features, and a two-step functionality reduction was proposed for the recognition of speech-related emotions. The overall emotion recognition rate of 85.18% for sex-dependent people was achieved using the SVM classifier [6].

In the following table, we summarize more work in the field of voice expression recognition.

Ref.	Type of feature / classifier	Dataset	Accuracy
[7]	Segment level features / DNN (DNN-ELM)	IEMOCAP	54,3%
[8]	fragmented feature based on a self-coder	EMO-DB, eNTERFACE	57,1% - 59,1%
[9]	Linear regression and DBN	MoodSwings Lite	94.59%
[10]	Vocal features / SVM, DBN	Chinese academy	94.6 %(DBN)

Poster Session

Distributed Adaptive Cluster Head Election Using Fuzzy Logic (DACHEFL) for heterogeneous WSNs in large scale

Oubadi Sihem
Laboratory on Computer Sciences Complex Systems (ReLa(CS)2)
Department of Mathematics & Computer Science
University of Oum El Bouaghi
Algeria
sissima.91@gmail.com

Derdouri Lakhdhar
Laboratory on Computer Sciences Complex Systems (ReLa(CS)2)
Department of Mathematics & Computer Science
University of Oum El Bouaghi
Algeria
derdouril@yahoo.fr

***Abstract*—The design of energy efficiency Wireless sensor networks (WSNs) is a challenging research since battery is consider as power source to the sensor nodes. Recharging battery is very difficult and impossible in some cases. Clustering techniques consist of partitioning the network into clusters. However, using the location and the energy information in the clustering can generate big overheads. In WSNs, the performance of the clustering scheme is generally influenced by the CH selection method and the number of clusters. This paper presents a Distributed Adaptive Cluster Head Election Using Fuzzy Logic (DACHEFL) for heterogeneous WSNs in large scale. The algorithm eliminates the need to set the number of clusters a priori. In addition, fuzzy logic is utilized in the CH selection in order to reduce overheads and the lifetime of the sensor networks can be prolonged.**

Keywords : Wireless sensor networks , Energy efficiency, Clustering, Fuzzy logic, Heterogeneous

I. Introduction

The Wireless Sensor Networks (WSNs) consist of a large number of small and cheap sensor nodes that have very limited computation capability, energy and storage [1]. They usually monitor some area, collect data and report to the base station (BS). They are randomly or manually deployed across an unattended target area. WSNs are designed and deployed for different purposes by various organizations. The observations obtained from sensor networks may be helpful in many software applications [2]. Several useful and varied applications of WSNs include applications requiring information gathering in harsh, in hospitable environments, weather and climate monitoring, detection of chemical or biological agent threats, and healthcare monitoring, etc. [3]

WSNs are characterized by many resource constraints such as energy, processing power, storage and transmission range. Out of these factors, energy of sensors has been the major resource constraint. Lot of researches has been carried out in the last decade to address this challenge [4]. Therefore, a limited energy resource at sensor nodes demands careful and intelligent energy utilization of available limited battery capacity.

The energy consumption can be reduced by allowing only some nodes to communicate with the BS. These nodes called cluster heads (CHs) collect the data sent by each node in that cluster compressing it and then transmitting the aggregated data to the remote sink or BS [3] . Appropriate CH selection can significantly reduce energy consumption and enhance the lifetime of the WSNs.

Most previous works in WSNs use precise, also called crisp values to specify the parameters of interest. Using crisp values to describe WSN parameters sometimes is not the most suitable approach. Integration of soft computing (SC) technologies in sensor nodes is an example of an application adapted to WSNs [3]. These computing technologies solve optimization problems and are appropriate for use in uncertain scenarios and they can achieve practicability and robustness with a low-cost solution. Examples are the neural network (NN), evolutionary computation (EC) (e.g., the genetic algorithm (GA)), support vector machine (SVM) and swarm intelligence. In addition to NNs and GA, Fuzzy Logic (FL) systems and Meta heuristic based approaches are commonly explored due to their simplicity and low computational costs [5].

To prolong the lifetime of WSNs, the clustering algorithm must be designed to achieve both energy efficiency and energy balance together. It should not only reduce the energy consumption for data transmission to extend the lifetime of a single node but also balance the energy consumption for the whole network. However, it is hard to optimize energy efficiency and energy balance simultaneously, which is difficult to be accurately described by mathematical model. How to realize the optimal combination of energy efficiency and energy balance is the key issue to extend the network lifetime. FL, on the other hand, has potential for dealing with conflicting situations and imprecision in data using heuristic human reasoning without needing complex mathematical model [6].

What makes FL suitable for use in WSNs is that it can tolerate unreliable and imprecise sensor readings. FL is much closer to human way of thinking than crisp logic and compared to other classification algorithms based on probability theory, it is much more intuitive and easier to use [7]. As a very

Taxonomy of Partitioning Clustering Algorithms in WSNs

Fatima Bouakkaz ,
ESI, Algiers, Algeria.
f_bouakkez@esi.dz

Maklouf DERDOUR
Tebessa University,TebessaAlgeria.
m.derdour@yahoo.fr

Abstract —

The use of WSN is increasing day by day everywhere, due to its applications in multiple areas. The progress of wireless communication and microelectronics create wireless sensor network ,which is a very important field of research, WSN have a diversity of its applications like Military applications, Agriculture, Health care, Medical monitoring.

Recently Wireless sensor networks (WSN) have gained greatly attention. The main defi of WSN is energy consumption, where prolonged network lifetime, is important necessity. From the solution proposed the Clustering method witch is a successful technique for achieving these goals. This work introduces the most popular techniques of clustering in WSN: Partitioning, Hierarchical, Density and Grid based.

We give advantages and disadvantages of them. Summarize different partitioning clustering related work like k-means c-medoid and fuzzy c-means are described. Finally provides the concluding remarks.

Keywords— Wireless sensor networks; Clustering; hierarchical, partitioning, density-based, grid-based; Low; Cluster Head ; Energy Consumption; K-Means ,C-medoid ;fuzzy c-means

I. INTRODUCTION

A wireless sensor network (WSN) is a wireless network that consists of distributed independent devices using sensors to monitor the physical or environmental conditions, at different locations. The development of wireless sensor networks was originally promote by military applications like battleground surveillance.

Currently wireless sensor networks are used in many civilian application areas, including environment and homeland monitoring, healthcare applications, home automation, and traffic control. The WSNs is built of few to several thousands of sensors of nodes, that each and every node is connected to each other sensor nodes.

Sensor node is connected to a central place called a base station, that is provides a connection to world.

A WSN is usually comprised a collection of sensors that are physically small, communicate wirelessly, are deployed randomly. Due to the limitation of sensors energy the Lifetime of the network became the biggest challenge in this type of network. Researchers have been forced to develop protocols that ensure that network energy

Figure1 show Wireless Sensors Network (WSN)

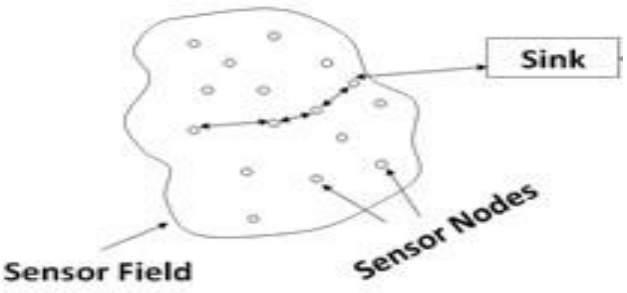

Figure 1 : Wireless Sensors Network (WSN)

Wireless Sensor Networks have large number of small size node , and low cost. But Constrained by Energy, computation, and communication.

Several research studies have shown that clustering routing in WSN; makes an important development in reducing energy consumption.

This paper is focused on clustering and specially the partitioned methods in WSNs. The next of this paper is structured as following: in section 2 the most popular

Clustering technique has been presented; Section 3 discussion considering Partitioned clustering in WSNs ;and finally conclusion and future works

II. CLUSTERING IN WSN

The Key advantage of "Clustering" is technique capable to extend life span of network, by reducing energy consumption. Clusters are easy to control as compared to large whole network. **[16].**

The architecture of clustering in WSN is shown in Figure 2. There are two types of data transmission in clustered WSN: intra-cluster and inter-cluster. Each node sense and transmit data to its CH. The CH receives and collected data and transmit it to sink directly or via intermediate CHs.

The data transmitted from groups of nodes are combined before transmitted, so that the numbers of transmissions needed are few . Transmit aggregated data to the sink by reducing number of nodes taking part in transmission need

Image compression by adaptive JPEG approach

[1] Saida Lemnadjilia, [2] Ahlem Melouah
[1] [2] LRI, Annaba
[1] sousou2212@gmail.com, [2] melouahlem@yahoo.fr

Abstract—This paper presents a new image compression approach based on the JPEG compressor. The proposed approach adapts the quality factor value according to each image part homogeneity. This method gives an acceptable compression rate and improves image quality comparing to the JPEG method.

Keywords: Image compression, JPEG, Adaptive, Quality factor, Homogeneity.

I. INTRODUCTION

The purpose of image compression methods is to reduce the data amounts of digital images when keeping satisfactory quality [1]. JPEG is a celebrated compression method very widely used since it publication in 1993. The purpose of this compression algorithm was to design an international standard to meet all the needs of different applications. It provides a very effective way to compress images with minimal loss in quality (lossy image compression method). That is why, JPEG is widely used in many areas as, digital photography, medical imaging, wireless imaging, document imaging, pre-press, remote sensing and GIS (Geographical Information System), cultural heritage, scientific and industrial fields, digital cinema, image archives and databases, printing and scanning, surveillance, facsimile etc. [2].

JPEG indeed a computation simple, a highly flexible and a rather efficient compression scheme that allows easily setting the compression rate, ranging from artifacts invisible with naked eyes to harsh compression that can slash the image size by 50 or even more [3]. However, the actual implementation of the JPEG algorithm is more difficult than other image formats and the compression of images is expensive computationally, the high compression ratios that can be routinely attained using the JPEG algorithm easily compensates for the amount of time spent implementing the algorithm and compressing an image [4]. Adding to this complexity, JPEG is a lossy compression method so, it inevitably degrades the image's quality [5].

Practically, JPEG has proven its success because it has guaranteed the compromise between quality and compression ratio. This compromise is based on the Factor Quality (FQ) quantization value. That is, if FQ is high so the compression rate and quality have become low otherwise the rate is increased and the quality restored resembles the quality of the initial image. Figure 1 gives an example of JPEG FQ influence.

Based on the supposition that the image had the same homogeneity, JPEG algorithm applied a single FQ value overall image. However, this supposition is not correct. There are few works that studies this problem such as:

(a) (b) (c)

Fig 1. JPEG compression example with FQ influence (a) original image size=225Kb, (b) JPEG image with FQ=30: acceptable quality and acceptable size =18Kb, (c) JPEG image with FQ=70: low quality and good size =5Kb.

The work [3] describes a simple, efficient and very accurate method for checking whether the quantization matrices of a given JPEG images match the standard ones and, if so, to identify the associated quality factor. The proposed method is based on a step approach. First the possible quality factors are identified from the quantization tables. This first step often returns a single possible quality factor, and in several cases two, from which the exact match can be checked quickly simply by comparing all the coefficients one by one. Though this approach is not very innovative on a scientific point of view.

[6] proposes a novel semantic compression based on vector quantization (VQ) and data hiding. The scheme makes use of the correlation of the original image and the compact image, and PCA was used to rearrange the VQ codebook of the original image and the compact image, respectively, in order to obtain the similar index values of VQ. After that, the difference values of these indexes are embedded into the compact image using the reversible data hiding scheme to generate a compressed image with small size and similar content. And the reconstructed image with original size and high quality can be easily obtained. The experimental results demonstrated that the proposed scheme can achieve the characteristics of semantic compression. Although our scheme is limited by VQ encoding, the quality of the decompressed image also is acceptable.

[7] Presents a modified JPEG algorithm that provides better visual quality than the Q-factor scaling method commonly used with Jpeg implementations. The

Approximate Solutions for Balanced Arc Routing Problem

Badis Bensedira
Department of Computer Science
08 Mai 1945 University, Guelma, Algeria
bensedira.badis@univ-guelma.dz

Abdesslam Layeb
Department of Computer Science
University of Abdelhamid Mehri Constantine, Algeria
layeb.univ@gmail.com

***Abstract*—This paper addresses a bi-objective version of CARP (Capacited Arc Routing Problem). CARP is a well known variant of ARP including several vehicles with limited capacity while RPP (Rural Postman Problem) its previous form considers only one vehicle with unlimited capacity .The goal of CARP is finding a set of low cost routes that serve a subset of edges with positive demands under capacity constraints. Unfortunately the routes built by CARP are not necessarily balanced. Indeed there may be a significant gap between costs of two routes. To cope with this inconvenience, we investigate in this paper an extended version of CARP that looks for a set of so-called balanced routes, that means a set of routes whose the costs are very close. To address this problem, we propose a modified version of the Path Scanning heuristic (PS) that expands simultaneously all the routes. Experimental results show that the modified Path Scanning heuristic is a promising approach for solving BCARP.**

***Index Terms*—Capacited Arc Routing Problem, Balanced CARP, combinatorial optimization, path-scanning heuristic.**

I. Introduction

The aim of Arc Routing Problem (ARP) is to find a set of routes including a subset of edges that minimizes a given cost. ARP can be either with or without constraints. One of the well-known variant of ARP is so-called Capacitated ARP (CARP). Given a set of vehicles, CARP has to find the set of routes that satisfies the demands distributed on edges. Note that the number of vehicles can be a fixed or a decision variable. CARP is NP-hard, even in the case of a single-vehicle problem called Rural Postman Problem (RPP). Exact solvers proposed for CARP are still to date limited to instances including until 190 edges [1].
Heuristics are essential for dealing with large-scale instances. For this purpose several heuristics have been proposed, namely Augment-Merges [2], Path-Scanning [3], Construct-and-Strikes [4], Augment-Inserts [5] and Ulusoyś tour splitting algorithms [6] for example.
In a general view, meta-heuristics are used for dealing with hard and big instances of several optimization problems. Indeed several approaches based on meta-heuristics have been proposed for solving CARP. A Genetic algorithm is presented in [7] to solve extended CARP (ECARP) and it has been tested on instances including 140 nodes and 190 edges. In [8] Ant Colony Optimization was applied to solve simple variant of CARP, Tabu Search [9] and GRASP have been presented in [10]. Outside the using of meta-heuristics, other research papers propose a transformation of CARP instance into a Vehicle Routing Problem (VRP) which a more studied. Compared to VRP, CARP has been less studied, despite its importance in real life. Indeed CARP has many applications frequently in many manufacturing and industries services. Many of its applications are related to networks roads such as mail delivery, waste collection, milk collection, water readings, electricity meters, and snow removal on streets and sidewalks, etc. Despite the importance of CARP in many real applications, its practical application is complexe and remains less widespread because there are several variants of this problem and each manufacturing or services industry has its own variant.

The goal of CARP is to find a set of low cost routes that serve a subset of edges with positive demands under capacity constraints. Unfortunately the routes built by CARP are not necessarily balanced. Indeed there may be a significant gap between costs of two routes. To cope with this inconvenience, we investigate in this paper an variant of CARP that looks for a set of so-called balanced routes, that means a set of routes whose the costs are very close. To address this problem, we propose a modified version of the Path Scanning heuristic (PS) that expands simultaneously all the routes for solving BCARP.
The remainder of this paper is organized as follows: Section II presents the motivation for this work. An overview of the CARP mathematical formulation for BCARP is presented in Section III. The Section IV concerns our main contribution. Experimental results are discussed in Section V and a conclusion is provided in Section VI.

II. Motivation

In real life, considering only a mono-objective formulation of CARP may be compromising for many manufacturing

ACE-MSA: Application for Creating and Evaluating Multiple Sequence Alignment

Rabah Lebsir[1,2], Abdesslem Layeb[2], Fariza Tahi[3] , Chaouki Abdaoui[1]

1-University of Guelma, ALGERIA
2-University of Constantine II, ALGERIA
3-University of Evry, University of Paris-Saclay, FRANCE

Abstract

The role of Multiple Sequence Alignment (MSA) is to align the sequences in their entirety to derive relationships and common characteristics between a set of protein or nucleotide sequences. Software applications for MSA play an important role in biological sequence analysis. They have evolved into routine technologies of computational biology.

In this paper, we present ACE-MSA application that use several aligners for creating and evaluate MSA. This application provides users the possibility to choose an aligner among others to generate MSA, and also evaluate MSA generated ubiquitously by comparing it to the reference alignment.

Keywords: Bioinformatics, multiple sequence alignment, greedy algorithm, local search, parallel computing, clustering, biological sequences.

1. Introduction

The multiple sequence alignment (MSA) is a very important task in Bioinformatics. It allows aligning two or more biological sequences like DNA and RNA to bring out similar or homologous regions. MSA is often used for other complex bioinformatics tasks such as protein analysis, identification of functional sites in genomic sequences, structural prediction, etc.

Several methods have been proposed to solve the MSA problem; the most used are the progressive methods (e.g., ClustalW[1] and ClustalOmega[2]) and iterative methods (e.g., Muscle[3], Dialign[4] and Mafft[5]). Each algorithm can give a different alignment; however, for a biologist it is better to see all the alignments in order to consistently analyze all the results. According to our knowledge, there is no tool that implements several aligners and gives users the choice between it.

Effective evaluation of MSA methods requires reference alignments. These references are the MSAs that are considered to represent the evolutionary history of the sequences most accurately. The majority of currently available benchmark MSA datasets are based on structural alignments of real sequences (e.g., PREFAB, OXBench , BAliBASE, SABmark) [6].

In this paper, we present a tool for aligning several sequences as well as evaluating a multiple alignment ubiquitously generated. The application is intended for two types of users: The first category concerns biologists who don't have much knowledge in computer programming which makes the task difficult for them, by offering an easy-to-use interface with several implemented algorithms. The second category concerns developers of MSA aligners who need to compare their results with the reference alignments.

Enterprise Ontologies: Theories and Applications

Sara Chelbi
Complex Systems Engineering Laboratory
Dept. of Computer Science
Badji Mokhtar University
Annaba, Algeria
sarach89@hotmail.fr

Nora Taleb
Complex Systems Engineering Laboratory
Dept. of Computer Science
Badji Mokhtar University
Annaba, Algeria
talebnr@hotmail.fr

***Abstract*—The enterprise is a complex entity, the management and understanding of this complexity, shows the need for a model that is coherent, understandable, consistent and concise. The use of ontologies for enterprise modeling enables the company's organization and operation to be analyzed, understood and mastered. Hence, it becomes commonly used in this field. This paper presents a theoretical bases in both fields, Ontologies and Enterprise modeling. As well as the applications of ontologies in Enterprise Modeling.**

Keywords—Enterprise ontologies, Enterprise Modeling, Ontology.

I. INTRODUCTION

In recent years, the concept of modeling has become fundamental, it helps to manage complexity and facilitates understanding. Structured techniques and related tools have emerged to carry out an industrial reorganization project, improve institutional and operational processes and evaluate their performance.

In artificial intelligence, ontologies are widely used for the conceptualization and representation of knowledge, information retrieval, integration and ensures interoperability. They are becoming increasingly essential for nearly all applications and in different fields. Notably, in the enterprise modeling. Organizations have been working to model their business services and processes, information systems and technical infrastructure, to improve organizational performance by improving complexity management.

The first section of this paper presents the most popular techniques of enterprise modeling that exist in literatures: MERISE, CIMOSA, GRAI, PERA, and GERAM. In section two, The source and definition of word "ontology" are presented. The main projects of the enterprise modeling by ontologies are presented in section three, the last section will be devoted to the applications of ontologies in enterprise modeling according to the type of organization.

II. ENTERPRISE MODELING

According to [1], An enterprise is a unit of economic organization or activity, defined as "those activities that are required to develop and deliver products and / or services to a customer". The enterprise is a entity that needs to be modeled in order to formalize all or part of it. The modelisation makes it intelligible and aims at understanding or explaining an existing situation or at realizing and validating a project [2]. The enterprise modeling is "the art of externalizing enterprise knowledge which adds value to the enterprise or needs to be shared. It consists in making models of the structure, behavior and organization of the enterprise" [2].

A large number of different business modeling approaches and techniques were used in industry and academia due to the complexity of enterprise organizations; we present briefly in this section an overview of the most common techniques.

A. MERISE

MERISE was created in 1978 by H. Tardieu, this technique was widely used for the creation of systems based on relational databases. It provides both of process, models, formalisms and standards for the design and implementation of information systems enterprise [3].

MERISE has three cycles: An abstraction cycle, an approval cycle and a life cycle.

1) *The abstraction cycle*: uses the three database levels and for each of these, an Entity Relationship and Interaction Oriented approach was chosen.

2) *The approval cycle:* recognizes the necessity of identifying decision points during the development of the information system: each point corresponds to a decision which has to be made before going further.

3) *The life cycle:* which is common to many engineering projects, consists of (long range) planning, initial study, detailed study, implementation, launching. and maintenance [4].

B. CIMOSA

CIMOSA (Computer Integrated Manufacturing Open System Architecture) was developed by the AMICE consortium as part of the ESPRIT project. It is an architecture that seeks at modeling integrated production systems [5].

To fully model specific aspects of the enterprise, CIMOSA defines four different views concerned with the enterprise: (1) function, (2) information, (3) resources, and (4) organization.

1) *The function view* describes the functional structure needed to meet the company's objectives and the related control structure, i.e. the rules that define the control sequences, or the flows of actions within the company and the underlying business process principles.

2) *The information view* describes the information required by each function.

Overview on Case-Based Reasoning in medical field

SIFI Amira
dept. informatique
LRI: *Laboratoire de Recherche en Informatique*
University of Badji Mokhtar Annaba, Algeria
sifi_amira@outlook.fr

GUESSOUM Souad
dept. informatique
LRS: Laboratoire des Réseau et Systèmes
University of Badji Mokhtar Annaba, Algeria
souadguessoum@yahoo.fr

LASKRI Mohamed Tayeb
dept. informatique
LRI: *Laboratoire de Recherche en Informatique*
University of Badji Mokhtar Annaba, Algeria
laskri@univ-annaba.org

Abstract— **Managing rapidly growing medical data is a challenge for physicians and researchers, and their use requires appropriate techniques. Among these techniques emerges the case-based reasoning that uses past experiences to solve new problems. This technique is one of the appropriate and widespread methods of modeling clinical reasoning for both diagnosis and therapy. Furthermore, it has an advantage over other knowledge-based methods in ease of use. Indeed, many researchers embedded case-based reasoning to carried out a useful decision support system to manage medical data.**

In this paper, we present an overview of recent researches on case-based reasoning applied in healthcare.

Keywords— Artificial Intelligence, Case-based reasoning, Decision support system, Medical diagnosis.

I. INTRODUCTION

Case-based reasoning is an important decision support for medical diagnosis and for physicians, Case-based reasoning is regarded as effortless to understand than other Artificial intelligence methods.

In this paper, we present some systems that couple Artificial Intelligence (AI) and case-based reasoning and These systems are:

- System to prevent thrombophilia risk, which aims to the early diagnosis of *thrombophilia* and signalizes patients with hypercoagulable states.
- Asthma Care Services, which develop a knowledge system for the treatment of asthma.
- Breast Tumor CBR system, which aids to predict benign or malignant tumor and also secondary cancer.
- Multiple measurement case-based reasoning, which is managing to development of liver cancer recurrence predictive models.
- System 4 Diabetes Support(4DSS), which help in managing diabetes type 1.
- Retrieval of HEmodialysis in NEphrological Disorders system, which support treatment in the field of end-stage renal disease (ESRD).
- The Mälardalen Stress System (MSS), which helps in the diagnosis and treatment of stress.
- Type 1 diabetes mellitus bolus insulin decision support, which helps patients to monitor their blood glucose levels.
- Back-propagation Neural - Case-Based Reasoning, which aids physicians for early diagnosis of liver disease.

II. CASE-BASED REASONING

The main idea of CBR consists in doing retrieval process in the set of source cases called also the case base to select the most similar problem to the new one to resolve called target case and then reutilizing its solution by adapting it to the new problem. Aamodt and Plaza identify the CBR cycle in [1] as a process of four phases:

- Retrieve: After elaboration and description of the current problem (target case), this first phase makes a search in the case base for the most similar cases to this problem using similarity measures.
- Reuse: This second phase consists in adapting the solution of the retrieved case in the previous phase to the current problem (target case).
- Revise: Once the target problem has a solution, this one is evaluated to find out if the solution is valid. The role of the user is crucial in this step.
- Retain: This last phase also called memorization consists of memorizing the problem and its solution in the case base.

These four steps are described in *"Fig. 1"*.

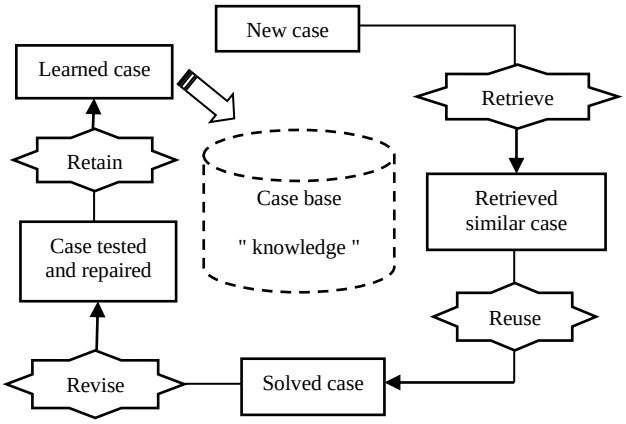

Fig. 1 Cycle of case-based reasoning.

III. SINGLE CASE-BASED REASONING SYSTEMS IN HEALTHCARE

The ability to solve problems with just a few knowledge-rich cases is a strength of the CBR approach and the systems below prove it.

Literature review: Software-Defined-Networking Solutions for Heterogeneous Internet of Things

1st Benkhaled Sihem
Dept. of Computer Science
University of Khenchela
(Lab. ICOSI)
Khenchela, Algeria
sibenkhaled@gmail.com

2nd Hemam Mounir
Dept. of Computer Science
University of Khenchela
(Lab. ICOSI)
Khenchela, Algeria
Hemam.Mounir@gmail.com

3rd Maimour Moufida
Dept. of Computer Science
University of Lorraine
(Lab. CRAN)
Nancy, France
moufida.maimour@univ-lorraine.fr

***Abstract*— Nowadays, the ubiquity of the Internet led to a diverse number of devices referred to as the "things" to have online access. The Internet of Things (IoT) framework's infrastructure is formed by sensors, actuators, compute servers and the communication network. The networks that this IoT devices will be operating on will continue to be heterogeneous, multiservice, multi-vendor and largely distributed; so the network become more complex and not easy to manageThe use of SDN technology aims to face the network and device interoperability challenge by allowing the automatic deployment and programming of network services between various objects independently to different technologies and reduce the heterogeneity.**

This paper presents a literature review of the pertinent approaches that focus on network and device IoT interoperability through SDN technology.

We deduced that this approaches trend to focus more on communicating and networking layers by exploit the characteristics of SDN technology in deferent network function like: routing, management and heterogeneity.

Keywords— Internet of Things (IoT), Interoperability, Software Defined Networks (SDN), Heterogeneity networks.

I. INTRODUCTION

Internet of Things (IoT) is a paradigm that provides a concept of connectivity of anything from anywhere at any time, so that the interaction of physical objects connected to the network can be done autonomously, and combines aspects and technologies coming from different approaches [2]. The use of IoT devices such as Laptops, Smartphones, Home Appliances, Industrial Systems, E-health devices, surveillance equipment, precision farming sensors, and other accessories connected to Internet would exceed 45 billion by 2020 [2]. These IoT sensors and actuators may use various types of technologies and communication protocols; also produce large volumes of data. Hence, the need for installing new network access and core devices will increase and create several issues like: interoperability, heterogeneity, network management, security and scalability, etc [3].

Particularly, in [3] the authors state that 40% of the potential benefits of IoT can be obtained with the interoperability between IoT systems. It is fascinating that this issue can be easily and dynamically resolved thanks to a technology solution: Software Defined Networking (SDN), by interating it into IoT architecture (SD-IoT), this new solution hide all the control and management operations from IoT devices by setting them inside a middleware layer, which alleviates the dependency from vendors.

This paper presented a brief overview of software defined IoT (SD-IoT). We discuss how SDN-based technologies can be used to overcome different issues such as: Protocol Interoperability between IoT devices, routing, Network Management, and Heterogeneous network access. These issues can prevent the interoperable operation of the IoT system.

II. INTEROPERABILITY ISSUE IN IOT NETWORKS

The IEEE defines interoperability as the ability to interconnect and communicate different systems to form a cost effective and easy implement network [4].

Interoperability can be seen from different perspectives due to the heterogeneity such as: device interoperability, network interoperability, syntactic interoperability, and semantic interoperability.

In this paper we focused on the use of Software defined networks technology in the network interoperability level [4].

Network interoperability: The networks that IoT devices will be operating on will continue to be heterogeneous, multi-service, multi-vendor and largely distributed. IoT devices generally rely on various short ranged wireless communication and networking technologies[4]. This level deals with mechanisms to enable seamless message exchange between systems through different networks (networks of networks) for end-to-end communication.

In fact, to make systems interoperable, each system should be able to exchange messages with other systems through various types of networks. Due to the dynamic and heterogeneous network environment in IoT, the network interoperability level should handle issues such as addressing, management, routing, resource optimization, scalability, security, QoS, and mobility support [4].

In this level, protocol interoperability, routing and network access management are the mains focus. At the standardization level, the IETF has developed a set of standards for routing including RPL, CORPL, and CARP and solutions for encapsulation including 6LowPAN, 6TiSCH, 6Lo, and Thread

IoT based clinical decision support system for Early Diagnosis and Prevention

Abstract

There are millions of people over the world suffering from different diseases only for lack of early detection system. Peoples are busy with their everyday life so they do not get enough time to go for regular checkup. The promising potential of the emerging technologies such as Internet of Things (IoT) and Clinical Decision Support (CDSS) has played an important role in the next-generation healthcare industry for better prevention and management of diseases quality patient care. By automating workflows and assisting physicians and other healthcare professionals.

This document presents a remote surveillance, diagnostic and medical forecasting framework supported by IOT-based decision support systems, in which mobile devices and sensors collect health data. Then securely sent to the cloud once the system detects abnormal health data it is compared to data from other users (another case) of systems to determine the user's health status and degree of gravity the result of this comparison is a list of possible diseases

Keywords— Patient similarity, decision support systems, Connected objects, Healthcare system,

I. INTRODUCTION

The promising potential of the emerging technologies such as Internet of Things (IoT) and Clinical Decision Support (CDSS) has played an important role in the next-generation healthcare industry for better prevention and management of diseases quality patient care. By automating workflows and assisting physicians and other healthcare professionals. [1].

This document presents a remote surveillance, diagnostic and medical forecasting framework supported by IOT-based decision support systems, in which mobile devices and sensors collect health data. Then sent to the cloud once the system detects abnormal health data it is compared to data from other users (another case) of system using the similarity calculation techniques to determine the user's health status, the degree of gravity and to retrieve the list of associated diseases.

II. DECISION SUPPORT SYSTEMS IN MEDICAL FIELD

Medical Decision Support Systems (MDSS) or Clinical Decision Support Systems (CDSS)are computer systems designed to help physicians or other health professionals make clinical decisions. [3] [4] These systems are playing an increasingly important role in medical practice. They can automate the monitoring process, reduce medication errors and improve the quality of care. they are beneficial in managing many of the problems encountered and offer practical, patient-centered recommendations for improving clinical decision-making capabilities in clinical practice and trials [3], They are applied to perform and assist with numerous clinical tasks such as:

- CDSS can be used to assess the patient's data and provide the possible diagnosis (Diagnostic Assistance).
- Can guide a novice clinician to a solution, diagnosis, or treatment.
- It provides real time alerts and warnings,
- Providing reminder of a treatment to prescribe in the context of the management of chronic diseases or Exam Duplication or Medication
- Can help reduce the number of errors (check for drug to drug interactions, dosage errors, and drug contraindication).
- Enable automated script generation and electronic transmission to the pharmacy.
- Can be interactive (with the clinician) to get the best results.
- Can be nearly autonomous, some systems are personal and can give a diagnosis. [4].

III. CATEGORIES OF CLINICAL DECISION SUPPORT SYSTEM

As early mentioned, CDSSs come into two categories, that is, knowledge based CDSS and non-knowledge based CDSS.

On the one hand, the Knowledge-based decision support systems (KBDSS) are systems designed to ensure more precise decision-making which is based on artificial intelligence, and on the application of information and communication technologies., These systems contains rules mostly in the form of IF-Then statements. [7]. As depicted in Figure 1, most KBDSSs used in the medical field consist of three parts: the first part is a communication mechanism to introduce information about patients,

Workshop

The 1st Workshop on Deep Learning and Internet of Things (DLIoT)

MODELING TRANSPORTATION PLANNING WITH ADDITIONAL COST

First Benoumelaz Farouk[1], Second B.. Abed Samira[2].,

B. F. Author [1]Institute of Mathematics, University , Batna 01,Algeria ;
e-mail: fbenoumelaz@yahoo.fr
A.S. Author, [1]Institute of Mathematics, University Batna 02,Algeria
e-mail: abed.samira@yahoo.fr

***Abstract*—**In this article, I proposed a model for optimization of freight transport problems with for indicators (FCTP4I) , (FCPT4: supply and demand and the type of goods and type of transport with the appointment of a fixed cost in the quality of transport) I proposed the fixed cost for the quality of transport, we address a special type of linear programming issues: transportation, and recharging. All of these can be solved by a simplex algorithm. We provided a solution to the problem of transfer dates of office national of the dates in Algeria and transported in least

***Keywords*—**Mixed integer programming, multi-index, transportation;planning

La Reconnaissance Des Expressions Faciales à Partir Des Images En Couleurs

Hadjer Boughanem
Département de l'informatique
Université de Tunis Elmanar
Tunis 1068, Tunis
boughanemhajer@gmail.com

***Abstract*—Au cours de la dernière décennie, l'image numérique s'est amplement développée, elle est devenue un outil indispensable de partage et d'échange social, en particulier les images de visages illustrent des expressions faciales qui peuvent transmettre non seulement notre identité, mais aussi nos états émotionnels à des moments donnés, et ceci en analysant nos réactions de tous les jours. En effet, les expressions faciales sont primordiales dans le processus de communication interpersonnelle non-verbal. Pour cela, la reconnaissance automatique des expressions faciales à partir des images statiques et/ou dynamiques fait de plus en plus l'objet de plusieurs travaux de recherche, ainsi que notre travail.**

L'idée est d'analyser automatiquement les expressions faciales à partir des contenus visuels véhiculés par ces images, afin de les classer dans des classes émotionnelles universellement reconnues (la joie, la tristesse, la colère, la surprise, la peur et le dégoût). Ceci peut servir dans plusieurs domaines, tels que l'informatique affective, le marketing (e.g. évaluation de l'efficacité des publicités…), la médecine (e.g. aide des gens autistes, évaluation des douleurs chez les malades…), l'interaction Homme-machines et dans l'exploitation sécuritaire.

Dans ce travail nous avons abordé les expressions faciales, la reconnaissance du visage, les émotions, ensuite nous nous sommes orientés vers la reconnaissance des expressions faciales dans leur composante émotionnelle, la représentation de ces émotions, et le fonctionnement d'un système de reconnaissance de ces expressions. D'où nous distinguons trois modules essentiels pour le fonctionnement des systèmes de reconnaissance, en commençant par la détection du visage à travers l'acquisition d'une image, ensuite l'extraction d'informations sur l'expression faciale et finalement, la classification de ces expressions.

Pour l'achèvement de notre travail nous avons utilisé le langage Python avec toutes les bibliothèques et les modules nécessaires pour ça. Dans notre cas nous nous sommes intéressés par la détection des émotions à partir des images en temps réel, à partir d'une webcam, et nous nous sommes basés sur l'approche des points de repères de visages « Landmarks », vu sa robustesse par rapport à d'autres méthodes dans le processus de la reconnaissance des émotions.

Les étapes principales du travail se résument comme suit :

- **Détection des repères faciaux: cette étape se repose sur deux actions; en commençant par l'obtention des images de visages à partir d'une webcam, il est nécessaire de rechercher et détecter le visage, en plus détecter et extraire les points qui représentent la structure faciale (même en mouvement et en changeant d'expressions).**
- **L'extraction des caractéristiques ; pour ce faire on a appliqué un algorithme d'apprentissage automatique. Cette étape se résume du fait de transformer les points superposés sur le visage en caractéristiques pour les faire parvenir ensuite aux classificateurs ainsi que d'autres informations nécessaires.**
- **La reconnaissance de l'émotion ; cette étape consiste à prédire les émotions à partir des données préenregistrées, en les attribuant aux classes prédéfinies universellement.**

Comme prochaine étape nous allons effectuer une étude comparative des performances quantitatives des méthodes de reconnaissance d'émotions à partir d'images 2D de visages, tout en les testant sur plusieurs bases d'émotions posées et d'émotions spontanées. En outre nous allons étudier la nouvelle approche d'évaluation de la similarité entre les émotions dans deux images de deux personnes différentes.

Keywords—Reconaissance faciale, émotions, images en couleurs, Python.

MNIST DIGITS CLASSIFICATION WITH DEEP LEARNING

Mrabti Fatima, Bourouba Hocine[1], Doghmane Hakim [1]
[1](PI :MIS , Université de Guelma, B. P. 401, Guelma 24000, Algérie)
Mrabti.fatima24@gmail.com

Abstract

The image classification is a classical problem of image processing, computer vision and machine learning fields. The aim of this work is the application of the Net model with convolutional neural network to perform digit recognition on the MNIST data set. The results show the effectiveness of deep learning based image classification using LeNet-5.

keywords: LeNet-5,Convolutional Neural Network ,Deep learning ,Machine learning, image classification.

1. Introduction

Machine learning has made remarkable progress in recent years. We went from near-unusable speech and image recognition, to near-human accuracy. The deep learning is a new area of machine learning research, which is recently of interests to more and more researchers and organizations [1]. It is a combination of engineering advances, best practices, and theory that enables a wealth of previously impossible smart applications [2]. As well, the deep learning allows computational models that are composed of multiple processing layers to learn representations of data with multiple levels of abstraction [3]. These methods are used in speech recognition, visual object recognition, object detection and many other domains. It discovers intricate structure in large data sets by using the back propagation algorithm to indicate how a machine should change its internel parameters that are used to compute the representation in each layer from the representation in the previous layer [3]. That , the neural networks (NN) have gained a renewed interest through the deep learning paradigm in the computer vision domain; they allow to surpass human performances on specific tasks [1]. Convolutional neural networks are nowadays widespread in the world of image recognition thanks to their ability to extract meaningful features simply starting from data. A convolution neural network (CNN) is a type of neural network which is able of extracting information out of images; data containing spatial information.

For this paper, a model of CNN is presented in image classification with a large quantity of data (MNIST digits) and the associated expected responses.

2. Artificial Neural Network

Artificial Neural Networks (ANNs) are computational processing systems of which are heavily inspired by way biological nervous systems (such as the human brain) operate [4]. They are classification models that are composed of elementary units called neurons. Each neuron is associated with weights and the set of weights from all neurons in the model constitute the model parameters. A typical architecture for neural networks is the fully connected multilayer neural network architecture where neurons are organized in layers and each neuron from a given layer takes the outputs of all the neurons from the previous layer as its inputs. With such architectures, using more layers enables to consider more complex decision boundaries for the classification problem, at the cost of having to learn more parameters for the model |5]. When, we compared to standard neural networks, CNNs have much fewer parameters which makes it possible to efficiently

Improved face recognition under varying conditions based on a combination of Weber-face and Contrast Equalization

A.H. Boualleg[1,*], H. Bourouba[2,*], M. Sedraoui[3,*], H. Doghmane[2,*], A. Menasria[1,*]

Boualleg.abdelhalim@univ-guelma.dz, Bourouba.hocine@univ-guelma.dz, sedraoui.moussa@univ-guelma.dz, doghmane.hakim@univ-guelma.dz, Menasria.azzeddine@univ-guelma.dz

[1]Laboratoire d'automatique et informatique de Guelma (LAIG)
[2]Problèmes Inverses : Modélisation, Information et Systèmes (PIMIS)
[3]Laboratoire des Télécommunications (LT)
*Université 8 Mai 1945 Guelma, BP. 401, Algeria 24000

Abstract:

Face recognition has been a very intention research area in computer vision for decades. This is devoted in its various potential applications and the availability of human face in computer's images and videos, which can be encountered in many corners of life.
Face recognition is used in many applications such as identity authentication, access control, surveillance, etc. There are many factors which affect the identification accuracy of a face recognition system such as variations in illumination, changes in pose, facial expressions, variations in age and occlusion. In these factors, the illumination variation and the partial occlusion are considered to be the most crucial problems. Its can greatly alter the appearance of a face in a captured image. To solve this problem, many methods have been proposed. These methods can be divided into three categories. In the first category, the intensities in a face image are redistributed to the correct irregular illumination such as, Histogram Equalization (HE) and Gamma Correction (GC). These methods called preprocessing methods normalize the illumination to acquire its normal lighting version. This strategy has several advantages such as, simplicity of using, fast application and its computationally efficient. But, it achieves an inferior performance in term of the recognition accuracy as it removes too much useful information.

The second category processes the illumination component of a face image to estimate its reflectance field. This allows obtaining the illumination invariant face representation. It should be noted that the output of methods in this category is always still an image. This category includes some methods such as, the Weberface (WF), Self Quotient image (SQI) and Gradient Face (GF). The WF is the most known method and has the ability to obtain a good performance for facial recognition under various lighting conditions.

The last category is assumed so that the small-scale features like lines and edges are

Reconnaissance des montants littéraux des chèques arabes basé sur un modèle d'extraction de caractéristiques amélioré

Az. Menasria [(1)], M. Sedraoui[(2)], A.H. Boualleg [(1)] , H. Bourouba[(3)] et H. Doghmane [(3)]

[(1)]Laboratoire d'Automatique Département d'Electrotechnique, Université 8 Mai 1945 Guelma
[(3)]Laboratoire des Télécommunications, Département d'Electrotechnique, Université 8 Mai 1945 Guelma
[(4)] Laboratoire des Problèmes Inverses, Modélisation, Information et Systèmes, Université 8 Mai 1945 Guelma
Menasria.azzeddine@gmail.com

Résumé:

La reconnaissance automatique de l'écriture représente l'un des objectifs principaux de plusieurs recherches durant ces dernières décennies et cela dans l'objectif de transformer les images de textes en leurs transcriptions numériques codées en ASCII ou UNICODE. Cette transformation assurant une lecture facile à comprendre par la machine et une manipulation aisée par les logiciels de traitement de texte. Pratiquement, l'écriture d'une écriture reste toujours un moyen essentiel de communication et d'échange d'informations dans notre vie quotidienne. Pour cela, de nombreux logiciels ont été développés dans la littérature en particulier ceux visant à automatiser des tâches assez difficile à réaliser par l'être humain. Toutefois, malgré les avancées réalisées dans les deux domaines d'informatique et d'automatique notamment le développement des machines puissantes et des logiciels très performants. Néanmoins, le problème de la reconnaissance automatique de l'écriture reste toujours un défi de nombreux systèmes de reconnaissance qui sont développés au cours de ces dernières décennies.

Dans la plupart des applications quotidiennes, le développement d'un système de reconnaissance efficace peut dépendre notamment de la nature de l'écriture à acquérir. En général, il existe deux types de reconnaissance qui sont : reconnaissance en ligne et reconnaissance hors ligne. La reconnaissance en ligne est celle qui se concerne les écritures fournies par les stylos électroniques, les agendas numériques et les Personal Digital Assistants (PDA). Par contre, la reconnaissance hors ligne est celle qui se concerne le tri automatique des courriers, le traitement de formulaires et la lecture automatique des chèques bancaires. Dans ce travail, nous verrons qu'il existe de nombreux problèmes à résoudre afin d'arriver à développer un système de reconnaissance efficace capable d'automatiser la reconnaissance d'une écriture arabe des chèques bancaires. Cet objectif présentera, par la suite, l'objectif principal de ce travail.

Récemment, plusieurs systèmes de reconnaissance automatique ont été développés durant ces dernières années. Ces systèmes sont assurés par des outils commerciaux qui sont actuellement disponibles dans la plupart des établissements public et privé. Parmi de ceux-ci, on peut voir les systèmes de reconnaissance disponibles dans les postes où la lecture des adresses postaux et le tri automatique des courriers sont assurés de manière systématique par des machines spécifiques. De plus, les systèmes de reconnaissance utilisés dans les banques où le traitement des chèques est assuré

From Object relational to NoSQL Databases: A Good Alternative to Deal with Large Data

Aicha Aggoune
LabSTIC laboratory, Computer science department, University of 8th May 1945 Guelma

Mohammed Sofiane Namoune
Computer science department, University of 8th May 1945 Guelma

***Abstract*—Recent emerging technologies such as Internet of thing and the social networking sites have significantly expanded the types, availability, and volume of data available to a database management system. Furthermore, the user needs to release the control over the registration of new information, and systems tend to be developed without complete knowledge of the schema of the database that will be available when they are run. On the other hand, object-relational databases have emerged for improving relational ones to store and manage complex data using object programming techniques such as references, polymorphism, inheritance, etc. However, these extended relational databases are incapable of storing and accessing huge volume of data. In this case, NoSQL database created. The NoSQL databases represent a good alternative to deal with large data. They are designed to easily scale out as and when they grow. The databases that belong to this category are highly scalable, powerful and efficient. There are four representation models of NoSQL data: key-value, wide column, document, and graph. In these models, the data are much more flexible since they are schema-less in the sense that there is no fixed schema that we should flow it. In order to process a large data from object-relational databases, it would seem necessary to move these data to NoSQL databases. A number of models and framework have been proposed in recent years to migrate the existing relational databases to the NoSQL ones. This paper gives a review of some of the recent researches conducted to migrate data from relational to NoSQL databases. We also present a methodology for migrating object-relational to NoSQL databases.**

Keywords—Big data, Object-relational databases, NoSQL databases, Migration.

Deep learning approach for facial expression recognition

Mohamed Nadjib KOUAHLA
LabSTIC Laboratoty
University 8 may 1945 of Guelma
Algeria
kouahla.nadjib@yahoo.fr

Adil Boughida
LabSTIC Laboratoty
University 8 may 1945 of Guelma
Algeria
adelfr@gmail.com

Muhammed Kurulay
Mathematics and enginering
Yildiz Technical University
Istanbul, Turkey
adelfr@gmail.com

Nene Adama Dian Diallo
Computer science departement
University 8 may 1945 of Guelma
Algeria
adelfr@gmail.com

***Abstract*— Facial expression is one/more movements of the muscles under the skin of the face. These movements translate the emotional state of an individual to the observers. Several contributions in the context of machine learning exists in the literature by varying characteristics and classifiers proves their powers in small databases. With the emergence of the concept of deep learning and large databases, a new line of research has been developed. Our project propose a facial recognition approach based on deep learning and more specifically on convolutional neural networks. An experimental test was made on the database FER 2013, the recognition rate obtained is 89.03%, the results are promising.**

Keywords—facial expression, deep learning, recognition.

I. INTRODUCTION

A facial expression is a visible manifestation of a person's emotional or psychological state. Facial expression detection is proving to be one of the most relevant applications in many areas such as computer-based learning [1], medical field, image processing and pattern recognition. Facial expressions vary from one individual to another, so this task is not easy to perform.

The automatic recognition of the facial expressions follows the general schema of a pattern recognition that is defined by the steps: features extraction, test/learning and classification.

Several works have been developed in the field of Machine Learning on the facial expressions recognition using several algorithms for the extraction of characteristics (statistical or structural) and classifiers (such as SVM, KNN ...) [2]. These works proved their powers in terms of the recognition rate on small databases.

Nevertheless, these results remain limited in the context of very large data processing such as Facebook and Google, which were formed using 200 million images and eight million unique identities. The size of this dataset is almost three times larger than any publicly available face data set.

The Deep Learning and in particular the convolutional neural networks (CNN) have appeared especially to solve the problems encountered by the machine learning. One of the most important ingredients for the success of these methods is the availability of large amounts of training data. The Convolutional Neural Networks (CNN) is one of the most representative network structures for deep learning technology and has been very successful in the field of image processing and recognition.

In this paper, we propose a novel approach based on a convolutional neural network for facial expression recognition. The rest of the paper is organized as follows: Section 2 gives an overview of some definition. Section 3 describes design of the proposed system. Section 4 discusses our results. Finally, Section 5 concludes the paper.

II. DEFINITION

A. Facial expression

Facial expression is a visible manifestation of a face of state of mind (emotion, reflection), cognitive, physiological activity (fatigue, pain), personality and psychopathology of a person. It is based on three main characteristics that influence the nature of the facial expression: the mouth, the eyes and the eyebrows. Ekman introduced the six basic emotions, which are happy, sad, anger, disgust, fear, surprise and neutral [3].

B. Deep Learning

Deep learning is a set of machine learning algorithms that attempt to learn at different levels, corresponding to different levels of abstraction. It has the ability to extract features from raw data through multiple processing layers consisting of multiple linear and nonlinear transformations and learn about these features step by step through each layer with minimal human intervention [4].

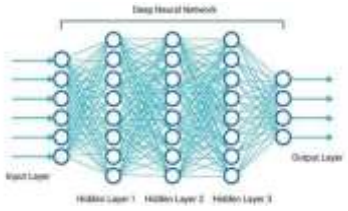

Figure1. Illustrative scheme of DL with multiple layers.

There are several architectures of Deep learning, notably, LSTM and CNN are two of the oldest approaches but also two of the most used in various applications. We can cited: