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Abstracts of presented papers

8715-Methodology of Evaluation of Low Cost Electronic Devices: Raspberry PI and Nvidia Jetson Nano for Perception System Implementation for Robotic Applications,
Patrick Bonnin, Pierre Blazevic, Edwige Pissaloux and Rabih Al Bachar

In order to realize perception systems on low cost embedded electronic devices as Raspberry PI 3, 4, and Nvidia Jetson Nano, an evaluation methodology to test these devices is proposed. These systems are dedicated for robotics applications for consummer uses as domestic autonomous robots, and systems to help visually impaired people to move safely. The methodology consists in choosing representative low level vision algorithms and in evaluating them using various implementations. CPU and GPU implementations are evaluated. The interest of the methodology is the speed of the evaluation. Indeed, the implementation of the reference algorithms is much faster than the implementation of the algorithms of the targeted application. The coarse time scale, between the treatments chosen as a reference and those to be implemented for the targeted application, gives an idea of the possibility of use. This methodology is then performed to evaluate and to compare the three devices : Raspberry PI 3, 4, and Nvidia Jetson Nano. The results shows the interest of the use of the GPU. The easy access to the GPU, and the simplicity of programming in Cuda is a great advantage for the Jetson Nano.

4564-Controller Design for Unamanned Quadrotors Behavior with PD-PID Controllers, Ali Bhar, Yassine Rabhi, Mounir Sayadi and Moez Bouchouicha

Unmanned Aerial Vehicles (UAV) are attracting significant interest in a wide spread applications. Quadrotors continue to play the most important roles in several fields and still catch the interest of researchers and practitioners. Forest fire detection and management are continuously improved by including economical new technologies to preserve ecosystem degradation and disasters. This paper deals with an inner outer loop of an economical design of attitude and altitude controller of a quadrotor. Quadrotor dynamics model is highly nonlinear system that could simplified with several assumptions. Non linear feedback linearization associated with LQR, SMC, PD or PID techniques are used to develop controllers. These techniques are often associated for control improvement and disturbances rejection. The PD-PID designed controller is used in an intelligent smoke or fire algorithm tracking or surveillance. Computational simulation results are conducted to assess the performance of the proposed approach.

677-Systematic literature review of collaborative SLAM applied to autonomous mobile robots
Khalil Aloui, Moncef Hammadi, Guizani Amir, Thierry Soriano and Mohamed Haddar

Motivated by the considerable developments we have observed in recent years, this paper presents a review of the scientific literature on collaborative Simultaneous localization and mapping (SLAM) applied to autonomous mobile robots (AMR), also known as multi-robot SLAM. SLAM is one of the most fundamental problems in collaborative robotics, since ego-motion estimation and map construction are essential to enable autonomous navigation. Therefore, collaborative SLAM will soon become the keystone of future robotic applications. In this paper, we define the basic concepts of SLAM with an extensive literature review. We also highlight the main challenges and limitations of collaborative SLAM applied to autonomous mobile robots. We conclude by exploring current domain trends and promising research avenues.

1002-Reinforcement Learning for Mobile Robot Navigation: An overview,
Nesrine Khlif, Nahla Khraief and Safya Belghith

In several years, a research interest in autonomous robot are in increasing. Embedding intelligence into a robotic system imposes the resolution of a huge number of research problems such as a navigation which is one of the fundamental problems of mobile robotics systems. To solve the robot navigation problem, we need to find answers to the three following questions: Where am I? Where am I going? How do I get there? These three questions are answered by three fundamental navigation functions: localization, mapping, and path planning, respectively.
In this paper we present an overview on works achieved the mobile robot navigation. First we briefly present the different functions of navigation. furthermore we talk about machine learning and reinforcement learning in mobile robotics. In addition we describe some path planning techniques. Some future direction are also presented.

6296-Polynomial modeling of a four-wheeled mobile robot,
Hela Belkhiria Ayadi, Nizar Ayari and Naceur Hadj Braiek

This paper proposes a model allowing to approach with a satisfactory precision the real behavior of a mobile robot with 4 steering wheels moving autonomously. The main contribution of this paper consists in the representation of the kinematic model of this class of mobile robot by a nonlinear polynomial model involving a polynomial development using the Kronecker product. The polynomial model makes it possible to widen the field of validity of the described system around the point of operation and to keep its nonlinear aspect.

5782-Robust adaptive observer design for a class of nonlinear LPV system under actuator fault,
Neila Bedioui, Radhia Houimli and Mongi Besbes

In this paper the problem of H∞ adaptive observer is studied for a class of linear parameter varying system under actuator faults. A new optimization problem described in terms of linear matrix inequalities (LMI) provide a solution to guaranty H_∞ performance. An extra variable was introduced to separate the Lyapunov function and the observer gain. The corresponding proofs of convergence are developed based on a polyquadratic approach. The efficiency and the performances of the proposed adaptive observer are illustrated on controlling a VTOL air craft.

7750-Revisited Control of Non Regular Singular System by using Open Loop Adaptive Scheduled Gain - Case of Methanizer,
Zied Tmar, Taieb Wafi and Mongi Besbes

This paper gives a review of the control of a nonlinear digester system (or methanizer) in order to control its methane production by studying its controllability and proposing a simple control that can achieve the

control objective despite the existence of lack of controllability problem and the fact that the system is simultaneously singular and non regular.

9088-A comparative study of fuzzy logic controller and sliding mode controller on DC/DC Boost converter, Benydir Mohamed, Mohamed Ajaamoum and Mhend Oubella

The DC/DC converters are massively used for switch-mode regulated power supply and renewable energy conversion systems such as photovoltaic. The main objective of these converters, is to maintain a constant output voltage of the converter despite variations in input source voltage or load current. Various techniques are commonly used to control these converters, such as linear controllers (PI, PID. . .) or non-linear controllers (fuzzy logic, sliding mode…). This paper presents a comparative performance Fuzzy Logic Control (FLC) and Sliding Mode Control (SMC) on DC/DC Boost converter. The two of the controllers are modelled, designed and simulated using MATLAB/SIMULINK software and the results obtained from all three techniques are compared and presented.

7158- LMI-based Position Control of Underactuated Robotic Systems via an Affine PD Controller: Case of the Pendubot,
Sahar Jenhani, Hassène Gritli and Giuseppe Carbone

In this paper, our main objective is to solve the position control problem of underactuated Lagrangian robotic systems via an affine PD-based control law. In order to design the condition on the feedback gains for the stabilization, we consider the dynamic model defining the difference between the nonlinear dynamics and the approximated linear one, and where such difference is assumed to satisfy some Lipschitz condition. Moreover, via some properties of the different matrices of the nonlinear dynamics, such Lipschitz condition is also developed. Furthermore, using the LMI approach, we design the stability conditions of the underactuated robotic system. Finally, the pendubot manipulator is adopted to verify the effectiveness of the affine PD-based control law.

1852- Fuzzy identification of nonlinear systems case of cascading reservoirs, Mesloub Khouloud and Boussaha Elhedi

This work is essentially focused on the following axes: fuzzy modeling and identification of the Takagi-Sugeno type for complex and highly nonlinear systems.

The identification of fuzzy models of the Takagi-Sugen type for the approximation of nonlinear systems based on input-output data of the system studied by applying the Gustafson-Kessel (GK) algorithm on a hydraulic installation represented by three reservoirs in cascade. The results obtained were verified by the VAF criterion of numerical performance to validate the identification approach chosen for our study

9133-Identification of SNP mutations linked to melanoma via a CNN network: application to the FGFR2 gene,
Saifeddine Ben Nasr, Imen Messaoudi, Afef Elloumi Oueslati and Zied Lachiri

One of the deadliest diseases in the world is skin cancer, especially melanoma. Detection and identification of this type of cancer is very difficult due to the strong similarity of its morphological characteristics with the characteristics of other skin cancer types, even with nevi. Early detection of melanoma saves effort, minimizes diagnostic time, and helps target the best treatment to increase the cure rate. Many deep learning systems are in actuality produced to help dermatologists early diagnose melanoma. These systems use several types of data for the classification between melanoma and non-melanoma, such as dermoscopic images and DNA or RNA genetic sequences. In this paper, we propose a new method of classifying melanoma and non-melanoma lesions. This method is based on the use of a deep learning network CNN (convolutional neurons network).The data we consider here are the SNP protein sequences of the human FGFR2 gene. We transform, then, these SNP sequences from their textual form into scalogram images to be taken as input to

the CNN classifier. The images are encoded in different color spaces in order to create four databases. In order to evaluate our method, we use quantitative measures such as: Accuracy, sensitivity, specificity and precision. The values obtained are very satisfactory. These results show the performance of the proposed system and confirm the relationship between small protein changes at the SNP level of the FGFR2 gene and melanoma.

9444-Comparative Analysis of Linear Regression and Logistic Regression for the COVID-19 Detection from CT-Scans,
Imen Messaoudi, Olfa Oukhai, Afef Elloumi Oueslati and Zied Lachiri

The new emerging Coronavirus disease (COVID-19) is a pandemic disease due to its enormous infectious capability. As declared by the World Health Organization (WHO) on 10 April 2022, the reported number of confirmed cases is over 496 million with more than 6 million death cases globally. Generally affecting the lungs, COVID-19 engenders fever, dry cough, and tiredness. However, some patients may not show symptoms. An imaging test, such as a chest X-ray or a chest CT scan, is therefore requested for reliable detection of this pneumonia type; Hence the necessity of automated methods to screen the COVID-19 from these images. Indeed, despite the decreasing trends both in the new and death reported cases, there is an extent need of quick, accurate, and inexpensive new methods for diagnosis. In this framework, we propose two machine learning (ML) algorithms: linear regression and logistic regression for effective COVID-19 detection in the abdominal Computed Tomography (CT) dataset. The ML methods proposed in this paper, effectively classify the data into COVID-19 and normal classes without recourse to image preprocessing or analysis. The effectiveness of these algorithms was shown through the use of the performance measures: accuracy, precision, recall, and F1-score. The best classification accuracy was obtained as 96% with logistic regression using the saga solver with no added penalty against 95.3% with linear regression. As for precision, recall, and F1-score the value of 0.89 was reached by logistic regression for all these metrics, as well as the value of 0.87 by linear regression.

5017- A novel Otsu Watershed based method applied for DNA Scalograms segmentation,
Mael Salah, Afef Elloumi and Zied Lachiri

The recent progress in next-generation sequencing technology has produced a huge amount of exponentially-generated genomic data. The processing of the latter requires large storage spaces. This study focuses on the eukaryotic genomes of C. elegans DNA organized into domains of different structures and activities. It presents an efficient automatic model to identify the DNA sequences. The developed approach is applied in order to code these sequences in the form of an "image" scalogram and, then, extract the DNA characteristic motifs by employing segmentation techniques in order to obtain its genomic signature. For this purpose, scalograms are segmented using improved watershed. We propose here modified watershed because the classic algorithm is sensitive to noise and may result in over-segmentation or under-segmentation. This modified watershed is based on gradient transformation, open-closed reconstruction and distance transformation. It is very important to use the more appropriate threshold when segmenting images. The choice of this threshold is based on “maximum between-class variance method” (Otsu). Finally, to assess the robustness of the proposed approach and show that it provides better PSNR and MSE when compared with the classic watershed.

5866- CNN for bacteria and archaea classification using FCGR images,
Nadia Selmi, Zeineb Chebbi Babchia and Afef Elloumi Oueslati

Prokaryotes, which comprise both bacteria and archaea, are found everywhere around us. Their detecting, counting, and classification is still a hard matter. This paper's main aim is the prokaryotes classification using the frequency chaos representation (FCGR) image and convolutional neural networks (CNN). First, we

Mapped each bacteria and archaebacterial DNA sequence by using the FCGR images with different orders. Next, we apply a binary classification using the CNN technique. Our model has shown a precision that exceeds 92%. This result shows the proposed method's performance.

2161 -Exploring the C.elegans genome genes' composition of exon and intron sequences using the multifractal analysis,
Zeineb Chebbi Babchia and Afef Elloumi Oueslati

Multifractal analysis has been very useful in studying different problems at DNA sequences. In this paper, we use it to investigate the C.elegans genome gene's composition of exon and intron sequences. First, we generate the gene's frequency
chaos game signal (FCGS) signal to transform its DNA sequence text representation into a 1D signal. Next, we apply the wavelet transform modulus maxima method (WTMM) to calculate the multifractality degree. We calculate also the percentages of exon and intron sequences present in the gene. Finally, we prove, with the obtained results, the existence of a relationship between the gene's multifractality and its exon and intron composition. Genes with longer intron sequences than exon sequences are highly multifractal. This approach will help us later to explore and classify automatically unidentified sequences.

502 -Deep learning-based cancer disease classification through MicroRNA expression,
Ines Slimene, Imen Messaoudi, Afef Elloumi Oueslati and Zied Lachiri

MicroRNAs (miRNAs) are a small noncoding RNAs that play an important role in gene regulation by inhibiting the translation or degrading messenger RNA (mRNA). In recent years, finding the associations between miRNA and diseases represents
an important area of research. Although several machine learning models have been built to optimize disease classification accuracy value, they remain insufficient with the large and complicated volume of biological data. In this work, we proposed a novel disease classification model based on deep learning algorithms. First of all, we convert the miRNA expression of human samples that are affected by cancer disease to image with DeepInsight tools. Then, we will compare three variants of ResNet models for disease classification which are ResNet50, ResNe101, and ResNet152. We consider five cancer disease which are Breast invasive carcinoma (BRCA), Glioma (GBML), Stomach and Esophageal carcinoma (STES), Pankidney cohort (KIPAN), and Ovarian Serous Cystadenocarcinoma (OV). Experimental results shows that a combination of DeepInsight and ResNet50 gives the best performance with 92.9% of prediction accuracy, 90.68% as sensitivity, and 94.07% as recall value.

916- Classification of human coding and non-coding regions based on CNN architecture,
Feriel Ben Nasr and Afef Elloumi Oueslati

Studying role and properties related to DNA sequences is a very difficult task. This task is more difficult when it comes to human genome which is composed by coding and non-coding zones. Complexity noticed in this context is related to the fact that human DNA is made up of millions and millions of nucleotides. For that reason, it seems evident that a puissant predictive model can have an enormous advantage in proceeding the exploration of human genome. In this work, we have randomly chosen 108 human genes to represent their coding and non-coding regions by color images. We have introduced a convolutional neural network model with 8 layers to classify our images. Our model has shown very promising results. Our testing rate has exceeded 92% and our model have identified over than 95% of coding zones.

557- Real time face detection and identification from video sequences combining LBP algorithm and convolutional neural network,
Zouhair Mbarki, Besma Miladi, Chiraz Ben Jabeur Seddik, Maryem Fadhly and Hassene Seddik

In this work, we propose an algorithm for face detection and recognition in real time application. The proposed algorithm combine the local binary pattern with the convolutional neural network and it' is splitted into two steps: The first step is face detecting from video sequence and the second one is face identification after features extraction operation using LBP algorithm. These two steps are performed using convolutional neural network which is a tending type of neural network based on deep learning. Extensive experiments on several test datasets are conducted to evaluate the proposed method. In fact simulation results are very interesting and show the efficiency of the suggested method.

1951-A Comprehensive Review of Sound-based Modalities for Automatic COVID-19 Detection using Deep Learning-based Techniques,
Marwa Zaabi, Walid Hariri, Nadia Smaoui and Imed Eddine Haouli

The World Health Organization has labeled the novel coronavirus illness (COVID-19) a pandemic since March 2020. It's a new viral infection with a respiratory tropism that could lead to atypical pneumonia. Thus, according to experts, early detection of the positive cases with people infected by the COVID-19 virus is highly needed. In this manner, patients will be segregated from other individuals, and the infection will not spread. As a result, developing early detection and diagnosis procedures to enable a speedy treatment process and stop the transmission of the virus has become a focus of research. Alternative early-screening approaches have become necessary due to the time-consuming nature of the current testing methodology such as Reverse transcription polymerase chain reaction (RT-PCR) test. The methods for detecting COVID-19 using deep learning (DL) algorithms using sound modality, which have become an active research area in recent years, have been thoroughly reviewed in this work. Although the majority of the newly proposed methods are based on medical images (i.e. Xray and CT scans), we show in this comprehensive survey that the sound modality can be a good alternative to these methods, providing faster and easiest way to create a database with a high performance. We also present the most popular sound databases proposed for COVID-19 detection.

2114-End-to-End Biometric System Based on Electro-cardio-gram Signal using Hybrid Topologies,
Chayma Yaakoubi, Rym Besrour and Zied Lachiri

Nowadays, connected objects have been spreading worldwide, producing a massive increase of exchanges through wireless networks. This critical fact makes data a more visible target to cyber-attacks .Eventually, traditional security methods are weaker and no longer qualified to satisfy security and privacy requirements. Instead, biometry showed its efficiency in overcoming the vulnerability of older methods. More precisely, research based on physiological signals are gaining tremendous attention .In this paper, we propose a hybrid end-to-end biometric identification system based on electrocardiogram (ECG) signals. Using a combination of two types of deep neural networks: one- dimensional convolutional neural networks (CNN) and recurrent neural networks (RNN). In order to test the robustness of our system, we evaluated its performance with the ECG-ID database containing records of 90 subjects. We achieved an accuracy of 98.53% using the GRU unit for RNN model.

3772-Stress Recognition from Speech by Combining Image-based Deep Spectrum and Text-based Features,
Noussaiba Jaafar and Zied Lachiri

This paper investigates how stress can be expressed by speech not only with the acoustic part but also semantic information. This investigation is established in order to recognize the different intensities of stress in surveillance applications. This research aims to recognize stress in human-human interactions at service desk by analyzing their behavioral patterns when interacting with each other's. More specifically, this paper focuses on stress recognition from speech with its verbal (acoustic) and non-verbal (semantic) parts. For this

purpose, we combine image-based deep spectrum with text-based features using neural networks. In the acoustic part, we use pre-trained Convolutional Neural Networks (CNNs) to extract descriptors from audio spectrograms. These descriptors are defined as deep spectrum features. Indeed, these features are the activations of fully connected layers from VGG16 which is an image classification CNN. In the semantic part, we adopt text-based features which are linguistic, word affect and other features that characterize the spontaneous speech. To obtain the final feature set for both deep spectrum and textual features, we apply Multilayer Perceptrons (MLPs) to learn the representations before twinning them with a neural network. Our fusion method achieves accuracies for weighted and unweighted average of 83.57% and 82.46%, respectively.

1128- Multiple Neural Network architectures for visual emotion recognition using Song-Speech modality, Souha Ayadi and Zied Lachiri

Visual Emotion recognition is an active field during the last decade. It belong to a different domains such as configuration of medical abnormalities, robotic tasks and security matters. The visual tasks became more and more difficult because of the variance of the information for the video processing. Treating this issues several neural network models can shows a different performance, specially the convolutional neural networks models that is most applied on image processing tasks. This latter is mostly known for it's ability for feature extraction and detecting patterns and it consider as the basic architecture for both VGG16 and ResNet50.
This paper presents a convolutional neural network compared with a deep neural network based on VGG16 and a ResNet50 models. The achieved results for CNN are 64.76\% for song and 71.92\% for speech. The achieved results for VGG16 are 50.06\% for song and 55\% for speech. The achieved results for ResNet50 are 57.73\% for song and 55.52\% for speech. Results shows that the Resnet50 model is suitable for both speech and song while maintaining performance stability.

4350- EEG Channels Processing For Reliable Seizure Events Identification,
Itaf Ben Slimen and Hassene Seddik

In the early 1970s, the diagnosis of epilepsy started to provide support for the automated analysis of EEG recordings and to detect this disease. Many studies in the literature have been proposed to detect epilepsy from EEG signals, which may be helpful for specialized clinicians. Artificial intelligence encompasses a variety of areas, and one of its branches is machine learning. The advent of these techniques in many areas of medicine, such as the diagnosis of epileptic seizures, has made significant advances. In this study, a comprehensive overview of three machine learning techniques, such as Support vector machine, k-Nearest Neighbor and Random Forest have been used to effectively distinguish EEG epileptic signals from a healthy EEG recording. The experimental results have been conducted on the data set of the University of Bonn. The obtained classification rates are 100% based on binary class. This result outperforms many existing EEG seizure detection methods cited in the literature.

1595-Prediction of survival proportion in patients with blood cancer,
Tasnime Hamdeni and Soufiane Gasmi

We present in this paper a study on a new survival model called the Marshall-Olkin Generalized Defective Gompertz Distribution (MO-GDGD). A simulation study is exhaustively conducted for different values of the parameters of the model MO-GDGD. Different sample sizes have been taken into account. Valuable insights were extracted from lifetime data using statis- tical inference methods. Survival analysis techniques were used on a population of patients suffering from the neurogenerative pathology Amyotrophic Lateral Sclerosis (ALS). The type I right- censorship of the data was taken into consideration.

6065-Detection of Local Gear Tooth Defect by a multi resolution analysis : DWT and EEMD,
Hana Tayachi, Hanen Gabzili and Zied Lachiri

Some mechanical defects are represented by transient signals of non-stationary character characterized by complex variations of the spectrum. These mechanical defects cannot be detected in the early stages of their appearance by using Fourier transform and classical filtering methods but they can be detected by applying advanced signal processing methods based on time scale analysis to provide information on the variation of signal frequencies with time. Time-frequency domain signal processing techniques can be used to identify and isolate faults in a rotating machine. The analysis of the signal spectrum can detect the occurrence of a fault while the decomposition of this signal in time can provide us with the nature and position of this fault. However, denoising these signals by wavelet analysis enhances the sensitivity of these indicators and improves the reliability of the investigation. The proposed method applies a multi-resolution wavelet analysis with varying levels of decomposition depending on the complexity of the gear faults, and then the ensemble empirical modal decomposition (EEMD) is used for early fault detection.
The method is tested on vibration signals from the test bench of the Technical Center for Mechanical Industries during twelve days. The results thus obtained showed us the triggering of a defect appears on the tooth of the gear from the fifth day and its evolution at the eighth day. These results are in adequacy with the report of expertise carried out on this gear system.

9152-Embedded monocular visual odometry,
Ernesto Balderas

Visual Odometry is a research area in robotics, that provide 3D position and orientation 6-degree-of-freedom (6-DoF) motion of camera over time. In this paper we present a system able to run in real time in an embedded system. We present a solution to the problem of monocular visual odometry from a data acquired by embedded camera, that process information into a graphical process unit (GPU) embedded system. Test realized show time evolution of our proposed algorithm recovering camera poses to update handheld camera trajectory.

5703-Masked Faces Recognition Using Transfer Learning,
Kebir Marwa and Ouni Kais

Through this paper, we present our study that aims to implement a masked face recognition model by using a transfer learning algorithms for facial recognition and masked faces datasets. To achieve the goal, we first implemented an algorithm based on a very deep neural networks model that is the Facenet. We have used the Labeled Faces in the Wild (LFW) database. Our choices come down to the considerable results of the Facenet model when trained with the benchmark in the field LFW dataset. As a result, he gave an accuracy rate that exceeds 98%. About masked faces, we used two different datasets that are Simulated Masked Faces Recognition Dataset (SMFRD) and Real world Masked Faces Dataset (RWMFD). Then we have established a performance comparison between the two datasets. Thereby, we tried to adjust our model to be robust against partial occlusions caused by wearing the mask. In comparison to other state-of-the-art approaches, experimental results on the Real-World-Masked-Face-Dataset indicate high recognition performance.

8665- YOLOv4 and branch attention: An improved approach to real-time object detection,
Chaima Gouider and Hassene Seddik

We propose a new enhanced YOLOv4-based model without considerably compromising its speed. We study the implementation of Selective Kernel attention mechanism and make extensive experiments to reliably optimize it. We explore several optimization techniques, mainly grouped, depth-wise separable and dilated convolution. Our implementation allows the neurons to dynamically adjust their receptive fields. We

introduce selective kernel convolution in CSPdarknet53 which is based on multiple branches with different kernel sizes. This enables the network to adaptively choose the appropriate size according to the input. Experiments show that our model improved YOLOv4 by 1.8% with a negligible increase in inference time. We were also able to decrease the GFLOPs and parameters of YOLOv4 making the training more efficient. Our model achieves 80.2% accuracy on the dataset VOC at a real time speed of 64 FPS on a single Tesla P100 GPU.

1171-Television broadcasting in sport events: technologies, applications and limitations,
Yosra Mlouhi, Mohamed Najeh Lakhoua, Tahar Battikh, Lotfi Maalej and Imed Jabri

The objective of this paper is to study the television broadcasting for sports events and the different techniques in use. In fact, a review on the different applications of the artificial vision and the augmented reality, on the one hand and an application of image processing techniques for television broadcasting for sports events, on the other hand are presented. Then, many research applications of image processing techniques for the various sports events are developed.

1114- Polyneuropathy detection using Electrodermal activity signal,
Nourhene Dhouibi, Jaouher Ben Ali and Mounir Sayadi

Abstract— Polyneuropathy (PNP) is generalized disorders of the peripheral nervous system. The doctors use Electrodermal activity (EDA) to detect this disease. They calculated the speed of the EDA data between the recorded EDA of the hand and the recorded EDA of the foot. Unfortunately, this method is not robust, easy and effective. To address in this challenge, we analyze the EDA data to estimate the subjects which have the polyneuropathy diseases. For this purpose, presented two different decomposition techniques (Fourier, and wavelet transform) to ensure the separation of the time and frequency components. In addition, the EDA signals were decomposed using FT and WT were used to calculate a linear and nonlinear features to extract a different proprieties of EDA data. Then, the features obtained from the EDA data decomposed were classified using Support Vector Machines (SVM), K-Nearest Neighbors (KNN) methods for different situations. Finally, classifier performances were compared. The best classification performance was achieved as 88.84%and 75.92 % using SVM and KNN classifier respectively.

3474-A Comparative Study of Non-Stationary Signal Processing Techniques for Epileptic Seizures Detection,
Badreddine Mandhouj, Mohamed-Ali Cherni and Mounir Sayadi

Currently, epilepsy is one of the most prevalent and unpredictable neurological diseases. The diagnosis of this pathology requires the analysis of electroencephalogram (EEG) signals. The non-stationary characteristics present in EEG recordings need advanced signal processing techniques and meticulous analysis to have an effective method to classify Electroencephalography signals of epilepsy disease, into normal, pre-ictal and ictal signals. In this context, several recent studies have suggested the use of time-frequency representations for this target. The most common techniques used are the Spectrogram, the Scalogram, the Smoothed Pseudo Wigner-Ville distribution (SPWVD), and the Hilbert-Huang Transform (HHT). This work presents an automated classification of epileptic EEG signals based on a comparative study of non-stationary signal processing techniques and a deep Convolutional Neural Network (CNN) classifier. In this paper, we used the publicly available EEG database of Bonn University. Data analysis shows that there is variance between the classifications results of the methods used for features extraction, with the preference of spectrogram techniques with a high average accuracy rate of 98.66 %.

7881-Optimal Management of Production and Maintenance Actions According to an Integrated Scheduling Strategy with Operational Considerations,

Zakaria Chekoubi, Noura Ettahiry, Sofiene Dellagi, Wajdi Trabelsi, Ilias Majdouline and Salim Bouslikhane

We decide to contribute through this paper in the development of an integrated policy of scheduling of production and maintenance actions taking into account operational constraints. The manufacturing system considered is flow shop a three-machine. these latter process a number of jobs with various given parameters. the system is affected by several deterioration failures, preventive maintenance is carried out throughout optimal periods. Maintenance policy adopted makes it possible to define the age of preventive maintenance corresponding to a minimum total cost of preventive and corrective maintenance of each machine. The main objective of our study consists in developing a new mathematical model which determines an optimal sequence of production and maintenance actions in order to minimize earliness and tardiness penalty costs. We provide illustrative numerical examples to illustrate the efficiency of the proposed integrated model.

2180-Optimal sizing of a vehicle fleet considering energetic type, economic and environmental constraints, Sofiene Dellagi, Jérémie Schutz and Anis Chelbi

In this paper, we consider a fleet of vehicles having different environmental impacts able to perform a set of missions during a predefined period. Two types of vehicles are considered, fuel and electric. The aim of this study consists in finding the optimal number of vehicles of each type to be used, the duration of their use, and their average usage rate. An analytical model is developed in order to express and optimize the expected total cost including the costs related to acquisition, environmental impact, as well as the resale value. Numerical results are presented and discussed.

1450- Optimal renewal strategy for wind turbine gearbox bearings,
Yazid Aafif, Lahcen Mifdal, Sofiene Dellagi, Anis Chelbi and Jeremie Schutz

The motivation behind this article is to look at a maintenance strategy for wind turbine gearbox's bearings. This strategy is frequently embraced in wind turbine farms in southern Morocco. The latter consists in monitoring the gearbox's internal temperature. Whenever it exceeds a prespecified limit, it means, in most cases, that the bearings start to be damaged. The production rate is then immediately reduced significantly by slowing down the wind turbine and cooling the gearbox for a period before recovering the normal output rate. Then, the wind turbine operators will decide to replace the gearbox's bearings as the occurrence becomes more frequent based only on the maintenance agents' judgement. For this strategy, an analytical model is developed to optimize the gearbox's bearings renewal period by balancing the cost of production loss and cooling each time the threshold temperature is exceeded, the cost of the new bearings, and the logistic cost associated with it.

7848- Recent Development Techniques on Digital Twins for Manufacturing: State of the Art,
Ghayth Gandouzi, Imen Belhadj, Moncef Hammadi, Nizar Aifaoui and Jean-Yves Choley

The fourth industrial revolution is the trend of todays industry. It incorporates many technologies such as Big data, Artificial Intelligence, Blockchain, Cloud Computing, etc. One of the main important areas that are affected by this revolution is the manufacturing sectors. These technologies exist in the industrial field, and they have already served to upgrade the manufacturing process and to put it on the path of digitalization. Therefore, a new concept for smart manufacturing systems that are currently in use, which is the Digital Twin for manufacturing. It is a virtual representation of a physical model that can be used to check the flexibility of the manufacturing layout, reproduce complex manufacturing systems and evaluate production efficiency in real time. The digital twin system allows us to test virtual scenarios, optimize and improve working conditions, reduce prototyping and waste, it predict also what will happen in the real world. In this paper, the main techniques used in the four main layers of a digital twin system, such as the Physical layer,

the Computing layer, Cyber layer and the service layer are reviewed in detail. Their requirements, problems, and proposed solutions are also discussed. At the same time, considering the ability of small and medium-sized enterprises to evolve to new working environments, as well as their revenues to apply digitalization, a digital twin framework based on open-source solutions is proposed.

581-Predictive Analysis Methodology for Industrial Systems: Application in Supplier Delays Prediction, Mohamed Aziz Zaghdoudi, Sonia Hajri-Gabouj, Christophe Varnier, Noureddine Zerhouni and Feiza Ghezail

In this paper, we develop a methodology that proposes a clear and reliable approach for collecting, analysing, and then improving the quality of industrial data. In addition, we put forward a machine learning approach based on data of good quality that allows the development of predictive models for decision support and industrial performance improvement. A case study in supply chain will be used to validate the suggested methodology. During the study period, the partner company experienced a high number of delivery delays from its suppliers. We propose using the company's order history, along with an appraisal of its quality, to create a decision-making tool that can predicts supplier delays.

3696-Availibility modeling for dependent competing failure process of deteriorating systems, Lazhar Tlili and Anis Chelbi

This paper proposes a preventive maintenance strategy for a system subject to competing failure modes consisting of a cumulative degradation process and random shocks. Three types of shocks are considered: extreme, cumulative and minor shocks. The system degradation is caused by internal process and shocks with certain magnitudes (cumulative shocks). When the degradation level exceeds a certain value, the system is considered in failure state. Furthermore, the system is subject to extreme shock (whose magnitude is higher than a given critical level) that provokes the total failure of the system. To avoid these situations, different preventive maintenance (PM) actions are performed at scheduled periods T or after a certain number of shocks N (cumulative and minor shocks), whichever occurs first. Under this maintenance strategy, the stationary availability function is obtained. A numerical example illustrates the analytical results.

9175-Synthesis of a Methodology of System Analysis and Automation for a Grain Silo, Mohamed Najeh Lakhoua, Jamel Ben Salem, Lotfi Maalej, Yosra Mlouhi, Tahar Battikh and Imed Jabri

The management of the production can be only efficient in a system whose activities are synchronized and permitting a good traçability. This is why the institution of a reliable Information System is primordial. To this effect, we elaborated a methodology in view of the automation of the equipment of a grain silo while treating the environment of management of the physical information regrouped in a Tabular Room.

8783-Intelligent Assistance with ML in Data Mapping ETL Processing, Ahlem Ben Younes, Leila Ben Ayed and Marwa Najjar

The ETL is a major component in the construction of a data warehouse. This element acts as an intermediary between data sources and data storage. It groups the data collection and preparation processes in order to undergo a set of transformations (cleaning, standardization, standardization, filtering, aggregation, etc.) before being loaded into the data warehouse. It was designed to act as an engine for extracting data from a variety of heterogeneous sources, homogenizing them so that they can be used together, and ultimately delivering consistent data that is suitable for analysis and decision-making. The complexity of the ETL lies in the large volume of data to be processed and their heterogeneity (syntactic, structural and semantic). This makes the generation of ETL the most expensive part in terms of time and budget as it represents about three-quarters of the decision project. In this paper, we propose a new intelligent approach for ETL generation based on metadata using machine learning techniques. Our goal is to reduce the complexity of

ETL. Metadata is introduced to reduce the use of resources and machine learning techniques are used to make the process more "intelligent" and can be adapted to different types of data.

3033-X-fold variants approach policies based,
Abdullah Said Al-Aamri and Imad Fakhri Taha

Looking to the standardized solutions which fail continuously and need humans intervention at each level or layer is a concern of the data science and needs to be ameliorated. The large amount of data stored continuously in all its types, varieties, and sources like social networks is a good marketplace where we might test the policy's impact when detecting APTs. Today, representing the most important sources of that data, millions are saved and exchanged of files on a daily and continuous basis, such as videos, pictures, Etc. Analyzing big data came to enable the user to benefit from the best available data in a better and more organized manner by using less effort and cost with high efficiency. [1, 2, 4] As patterns and relationships have been identified between the various data that were not present previously, new ideas on how to deal with the massive amount of data in an instant and fast. Also, several tools have been discovered to extract data and analyze and summarize them in an accessible and understandable way.

4253-Location of an urban distribution center,
Syrine Guinoubi, Yasmina Hani and Abderrahman Elmhamedi

Nowadays, urban freight transport has become a generator of nuisance and contributes to traffic congestion. For decades, several research works have treated the urban distribution center (UDC), as a solution to this problem. The objective of our article is to propose an approach for the location of UDCs to optimize the total distance. In this work, we will present the deployment of these UDCs and we will analyze their possible problems. We will propose a review of the literature on location methods as well as the evaluation of its economic performances. And then we will do modeling on the Flexsim to see its impact on urban logistics. Subsequently, we will describe the solution that allows it, where we have developed two new specific algorithms; the grid method and the center of gravity method. This combination of methods has given us a good result. Then we finished with an example and comparative analysis between two cases, one with UDC and the other without seeing the effect of this implantation, which reflects the blessed side of this implantation.

9041-Tuning PSO Parameters For the Path Planning Problem,
Achref Gadhgadhi, Yassine Hachaichi and Hassen Zairi

Particle swarm optimization (PSO) is one of the most used metaheuristic algorithms in the field of robotics path planning, because of its simplicity to implement and to its high efficiency in resolving such a problem. In this paper we propose a parameter tuning approach for PSO algorithm to enhance its effectiveness, in order to obtain a reasonable solution in a space with obstacles. We will try to have the best quality solution, the shortest path avoiding obstacles in our case, with the least cost, which is the number of iterations and the number of particles.

1495-Design and Implementation of a New-Optimized ROS-Based SLAM for Mobile Robot,
Khaled Khnissi, Chiraz Ben Jabeur and Hassene Seddik

The Simultaneous Location and Mapping (SLAM) problem addresses two important issues in mobile robotics. The first question is: Where am I? The second question concerns the characteristics of the robot’s environment: What does the environment in which I find myself look like? In a SLAM system, a robotic vehicle placed in an unknown environment and position must build a map of the environment while trying to locate itself on this map. The robot has several sensors that help it retrieve the information it needs. This paper

presents the implementation of an optimized localization and navigation algorithm to improve the localization accuracy of TurtleBot3 Burger and avoid navigation failure. SLAM (Simultaneous Localization And Mapping) consists of creating a precise map of a location and locating itself within this map. It aims to make the robot completely autonomous.

4391-Fuzzy Logic Based Control for Autonomous Mobile Robot Navigation and obstacles avoidance,
Habiba Batti, Chiraz Ben Jabeur, Hassen Fourati and Hassene Seddik

In this work, we propose the path planning and obstacle avoidance for mobile robot in a hostile environment using two fuzzy logic controllers. The primary objective of this article is to show how to guide the autonomous mobile robot in an unknown cluttered environment using the minimum eight-rule based fuzzy controller. The proposed approach system is used to adjust the motions, directions and movements of the mobile robot to reach the goals with obstacle avoidance strategy. When the robot nears to the obstacle, the obstacle avoidance behavior is reactive, otherwise the goal finding behavior continues. To validate the feasibility and effectiveness of the proposed model we used V-REP and MATLAB software. The simulations results showed that the mobile robot could navigate successfully in unknown environment thanks to the performance of our two intelligent controllers.

9646-Modeling, Simulation and Control of a flying quad-rotor By Fuzzy Logic with obstacle avoidance,
Ammar Kthiri, Chiraz Ben Jabeur and Hassene Seddik

This paper discusses two techniques forcontrolling the flying robot as a quad-rotor:The classic derivative integral proportional (PID)controller based on a known mathematical model, which isdeveloped to stabilize the quad-rotor and ensure the tracking ofdifferent types of trajectories. The second is fuzzy control. It is about controlling complex nonlinear systems such as the evolutionof the robot in different environments (they can be large, imprecise,or unknown). This brings us to the definition of the basics and theconcept of this fuzzy controller. The particularity of this commandis to reproduce human behavior rather than producing a mathematical model of the system as a PID controller.The fuzzy controller can thus be seen as an algorithm thatcan convert a formal control strategy based on expert knowledge into an automatic control strategy. This control algorithm is based on a collection of fuzzy rules called a rule base. A comparative study between the two controls in an environment (in the presenceand absence of wind) shows the efficiency and performance of thefuzzy approach by input to the PID. Sample simulations of the VTOL system model in the MATLAB / Simulink environment illustrate the comparison results.

1584-Design and Implementation of PD and Fuzzy Controllers for a ROV,
Chiraz Ben Jabeur and Hassene Seddik

In this paper a full approach of modeling and control of auto-depth control of a Underwater Remotely Operated Vehicle is presented. In fact, a PID and a fuzzy controllers are developed to be applied to control the position and the attitude of a ROV. The goal of this work is to concept a smart controller to supervise the ROV for an optimized behavior while tracking a desired trajectory. Many challenges could arise if the ROV is navigating in hostile environments presenting irregular disturbances in the form of underwater currents. The ROV has to quickly perform tasks while ensuring stability and accuracy and must behave rapidly with regards to decision making facing disturbances. This technique offers some advantages over conventional control methods such as PID controller. Simulation results are obtained with the use of Matlab/Simulink environment and are founded on a comparative study between PD and fuzzy controllers based on underwater disturbances. These later are applied with a degree of strength to test the ROV behavior. These simulation results are satisfactory and have demonstrated the effectiveness of the proposed fuzzy approach. In fact, this controller has relatively smaller errors than the PID controller and has a better capability to reject

disturbances. In addition, it has proven to be highly robust and efficient facing disturbences in the form of underwater currents.

3381-An overview: Reinforcement Learning for Mobile Robot Navigation, Nesrine Khlif, Nahla Khraief and Safya Belghith

In several years, a research interest in autonomous robot are in increasing. Embedding intelligence into a robotic system imposes the resolution of a huge number of research problems such as a navigation which is one of the fundamental problems of mobile robotics systems. To solve the robot navigation problem, we need to find answers to the three following questions: Where am I? Where am I going? How do I get there? These questions are answered by fundamental navigation functions: localization, mapping, and path planning, respectively. In this paper we present an overview on works achieved the mobile robot navigation. First we briefly present the different functions of navigation. furthermore we talk about machine learning and reinforcement learning in mobile robotics. In addition we describe some path planning techniques. Some future direction are also presented.

1549- Control of an Autonomous Surface Vehicle with Variable Load by Predictive Control, Maher Mkhinini, Intissar Sayahi and Ikram Maaoui

In the field of marine environment protection, the clean-up of polluted areas is increasingly a difficult task. Indeed, the exhaustive exploitation of this environment, in particular oil exploitation, drilling platforms or waste resulting from the intentional or accidental dumping of rubbish in the sea by man, has only increased the rate of pollution of these environments. Consequently, getting rid of this waste and hydrocarbons has become a complicated, costly and time-consuming operation. This is the context of the Sea-neT project, which aims to offer e-capable, flexible and inexpensive solutions for the de-pollution of aquatic areas, particularly for sheltered areas (coasts, ports, rivers, canals, lakes, etc.). As the carrier of this project, the company IADYS has set up the Jellyfishbot, a small remotely operated clean-up robot that collects macro-waste and hydrocarbons. In order to improve the performance of this robot and to automate it in an intelligent and predictive way .

461-Human-in-the-loop dynamic modeling and control of an upper-limb exoskeleton, Sana Bembli, Nahla Khraief and Safya Belghith

This paper presents a contribution to the human-in-the-loop dynamic modeling and control of an upper-limb exoskeleton. The treated system is a human upper limb in interaction with a two-degree-of-freedom robot (2-DoF). The aim of this work is to model and to control the flexion/ extension movement of the shoulder and the elbow. First, the dynamic modeling of the considered system is presented. Next, an Adaptive Terminal Sliding Mode (ATSM) is developed to control the exoskeleton-upper limb system. Finally, the performance and the effectiveness of the proposed dynamic model and the Adaptive Terminal Sliding mode algorithm are provided by simulation results.

756-COMPARATIVE ANALYSIS OF SLIDING MODE AND P&O MPPT CONTROLLERS, Sana Mouslim, M'Hand Oubella and Mohamed Ajaamoum

The power delivered by a solar photovoltaic generator (PVG) strongly depends on the level of irradiance G, temperature T of cells, total or partial shading but also the nature of the fueled load. The PPV-VPV power characteristic of the PVG has a maximum power point (MPP) corresponding to the optimal operating point. Since the position of the MPP depends on the level of irradiance and the temperature of the cells, it is never constant over time. Therefore, a control strategy is requisite to extract maximum power from solar panels under all operating conditions. The objective of this work is to design a MPPT controller based on sliding

mode controller (SMC) that is applied to a buck-boost converter in order to achieve an optimal PV array output voltage. The proposed MPPT controller using SMC has been developed so that the operating point converges to the optimum operating point. The validation of the proposed controller is shown by MATLAB/SIMULINK simulation. The results confirm the effectiveness of the sliding mode control MPPT under the parameter variation environments. Moreover, a comparison analysis of the proposed SM controller and classical MPPT algorithm using Perturb-and-Observe method has been designed for the same PV power system in order to evaluate the robustness and stability against parameter uncertainties for the two proposed controllers.

5557-Traffic sign recognition for controlling intelligent vehicle,
Nadia Jmour, Sahar Maamri, Sehla Loussaief and Afef Abdelkrim

Deep learning is a subfield of artificial intelligence that has emerged this recent years with several applications. We are particularly interested in using convolutional neural networks for traffic sign images classification. Our traning framework is based on the AlexNet pre-trained model. To improve its prediction accuracy we use fine tuning techniques. The generated prediction model is then interfaced with a mobile robot equiped with a Raspberry Pi hardware board and a camera. Test environment shows how well robot system takes naviguation decisions based on the classification pre-trained model.

9572 -Overview of EMG signal preprocessing and classification for Bionic hand control,
Monaam Ayachi and Hassene Seddik

This paper treats the field of Biological Signal especially one of the most used signals in the field of prosthetic devices, which is the EMG signal. After introducing this kind of signal, we will talk about different techniques used for preprocessing it in order to prepare it for classification tasks. We Will then overview different noises that affect those sensible type of signals, different techniques applied for filtering them and the useful envelope detection methods that can be applied on EMG. The next part of this paper will look at some famous feature extraction and classification techniques that proved themselves useful when dealing with classification tasks of biological signals. Finally, we will present the mechanical design of a multiarticulate multifunctional prosthetic hand, the promising classification results that can gives 98.3% and our perspectives.

791 -3D image segmentation for lung cancer using U-Net architecture,
Elloumi Nabila, Ben Chaabane Salim and Seddik Hassen

In this paper, we present a new method of medical image segmentation based on U-Net algorithm. The general idea is to create an optimal segmentation that allowed the medical staff to distinct the different parts of the tumor using the U-Net architecture which represent the more elegant architecture, called a fully convolutional network. The main idea is to complete a contracting network by successive layers; pooling operations are replaced by oversampling operators. Therefore, these layers increase the resolution of the output. This technique is employed to merge different data sources in order to increase the quality of the information and to obtain an optimal segmented image.
Segmentation results from the proposed method are validated and the classification accuracy for the test data available is evaluated, and then a comparative study versus existing techniques is presented. The experimental results demonstrate the superiority of using Modified U-NET for image segmentation.

7069- CNN-based Spiral-drawing classifier to detect Early-Stage Parkinson's Disease,
Yash Khare and Pratima Singh

Parkinson's disease is a neurological condition wherein one experiences a loss in control of motor movements. The disease usually infects gradually but worsens over time. Parkinson's often starts with a tremor in one hand. Slow movements, stiffness in the body, and loss of balance are some of the major symptoms of the disease. Damaged nerve cells present in the brain cause drops in the levels of dopamine in the body. It is very difficult to detect Early-Stage Parkinson's Disease. Researchers have now been able to detect Parkinson's disease at an early stage (Perhaps at Stage 2 or Stage 3), but there have been no significant advancements in the detection of Parkinson's at the initial stage. Analyzing the handwriting styles can be one of the initial symptoms of the disease. The dataset given by NIATS of the Federal University of Uberlandia[1] was used in our research. In this study, we present a CNN model that can distinguish between spiral drawings made by patients with Parkinson's disease and those made by people not suffering from Parkinson's disease with 90.28 percent accuracy.

8973- Computer-aided diagnosis of polyps, ulcer and bleeding on wireless capsule endoscopy images using deep learning: a systematic review,
Mohamed Achraf Belabbes, Lahcen Koutti and Said Charfi

Gastrointestinal (GI) system diseases have increased significantly, where colon and rectum cancer is considered the second cause of death in 2020.Wireless capsule endoscopy (WCE) is a process in which a patient swallows a camera-embedded pillshaped device that passes through the gastrointestinal (GI) tract, captures and transmits images to an external receiver. WCE devices are considered as a replacement of conventional endoscopy methods which are usually painful and distressful for the patients. Endoscopy is an important tool for detecting and diagnosing digestive diseases like ulcers, polyps, celiac disease, bleeding, and Crohn's disease. Deep learning has the potential to automatically detect diseases and shorten WCE reading time. Detection accuracy was above 90% for most studies and diseases. In this study, we carried out a systematic review to evaluate the use and performance of deep learning for WCE and also the different approaches used in such diseases detection.

8843- SegNet Architecture for Dermoscopic Image Segmentation,
Ekram Chamseddine, Lotfi Tlig, Mounir Sayadi and Moez Bouchouicha

Lesion segmentation is a fundamental step in developing a Computer-Aided Diagnosis System for skin cancer detection. However, accurate segmentation is challenging due to the variability of lesion characteristics (e.g., shapes, sizes, colors, etc.) and artifacts in a dermoscopic image (e.g., hair, color charts, etc.). Therefore, most of the existing methods heavily depend on pre-processing procedures that often cause an information loss and, consequently, an inaccurate segmentation. This paper proposes a deep learning-based method using a SegNet architecture for pixel-wise segmentation. First, we trained the SegNet on the PH2 dataset. However, this dataset is small, and the images are almost clean of artifacts. Unlike the PH2 dataset, the ISIC 2018 dataset contains a more significant number of images with different types of artifacts. Therefore, we trained the proposed model on the ISIC2018 dataset in a second experiment. As a result, we achieved an IOU of 95.72% for the PH2 dataset and an IOU of 95.06% for the ISIC2018 dataset. A combination of quantitative and qualitative experimental evaluation has been conducted on two publicly available datasets. The achieved results of the empirical analysis demonstrate that the proposed method is highly accurate.

8789- A deep learning-based methodology for breast cancer Classification from thermal images, Houmem Selimi, Imen Cherif and Sabeur Abid

This paper deals with breast cancer diagnosis which is the most frequent in females. Currently, mammography is considered as the most effective tool for the early detection of this disease. In some countries, mammography still not affordable due to economic and social issues. To overcome these constraints, we propose to use the thermal images to construct a computer aided diagnosis system based

on deep learning approach. Simulation results compared with respect to several classification methods using mammography images, show that the proposed intelligent technique provides very high classification accuracy rate with good localization.

6373- Analysis of Functional Connectivity of Resting State fMRI on Autism Spectrum Disorder (ASD)
,Zeraii Abderrazek, Benameur Narjes, Rmili Lazhar and Kraiem Tarek

Resting-state Functional Magnetic Resonance Imaging(fMRI) data distinguishes the temporal correlations in Blood Oxygen Level Dependent (BOLD) signal and these temporal correlations are observed to reflect intrinsic cortical connectivity, which is switch off during attention demanding, non-self-referential tasks, called Default Mode Network (DMN). The relationship between fMRI and anatomical connectivity has not been studied in each element, however, the preceded studies have tried to clarify this relationship using T1 MRI and fMRI. These studies use method that fMRI data assists MRI data or vice versa. In this study, we hypothesized that functional connectivity in resting state would reflect anatomical connectivity of DMN and the combined images include information of fMRI and T1 showed visible connection between brain regions related in DMN. The functional connectivity was determined by objective and advanced method through Seed-Based Connectivity and ROI-to-ROI connectivity Analysis. There was a stronger connection between Posterior Congulate Cortex (PCC) and medial prefrontal cortex (mPFC) than medial temporal gyrus (MTG) and PCC. This technique might be used in several clinical field and will be the basis for future studies related to aging and the brain diseases.

1852- Fuzzy identification of nonlinear systems case of cascading reservoirs,
Mesloub Khouloud and Boussaha Elhedi

This work is essentially focused on the following axes: fuzzy modeling and identification of the Takagi-Sugeno type for complex and highly nonlinear systems. The identification of fuzzy models of the Takagi-Sugen type for the approximation of nonlinear systems based on input-output data of the system studied by applying the Gustafson-Kessel (GK) algorithm on a hydraulic installation represented by three reservoirs in cascade. The results obtained were verified by the VAF criterion of numerical performance to validate the identification approach chosen for our study.

332-Efficient Method for Automatic Detection of Glaucoma Disease using Optimal Batch Size and Fine-tuned Convolutional Neural Networks,
Imed Eddine Haouli, Walid Hariri and Hassina Seridi-Bouchelaghem

Glaucoma is a chronic disease that results in vision loss and life quality deterioration. This disease provokes gradual damage to the optic nerve which increases eye pressure. Therefore, it is becoming more and more difficult to deal with this disease all across the world. To prevent vision loss, early detection is the key solution that limits this disease and develops new treatments. Recently, deep learning and more especially Convolutional neuronal networks (CNNs) have proven high performance in medical image classification. Nevertheless, to achieve this performance, CNNs need to fix the parameters before the training phase. In this paper, we investigate the impact of the batch size on Transfer Learning (TL) for glaucoma detection using fundus images. Thus, five pre-trained models have been fine-tuned to perform a binary classification (i.e. Glaucoma and Normal cases). Our proposal consists of finding the optimal batch size for each pre-trained model refers to by OBS. Moreover, to further enhance the performance, we have combined the models using the majority voting method by taking into account the OBS of each one. The experimental results on five challenging datasets of retinal fundus images show that the ensemble model technique improves the performance of single-use models, and outperforms similar state-of-the-arts.

4640- YOLOv4 enhancement with efficient channel recalibration approach in CSPdarknet53

Chaima Gouider and Hassene Seddik

In recent years, Attention Mechanisms in the computer vision field have been gaining a significant level of importance, thanks to their great performance and adaptability with convolutional neural networks. In this paper, we propose a new model YOLOv4-SE that outperforms YOLOv4 thanks to the integration of channel attention. We enable the network CSPdarknet53 to model interdependencies between channels and adaptively recalibrate the channels' weights. Furthermore, we optimize and enhance the squeeze and excitation block by thoroughly studying mixed pooling. Experiments show that our model achieves a 1.6% higher mAP than that of YOLOv4 on Pascal VOC 2007 test dataset with marginal computational overhead. YOLOv4-SE is a real time object detector that runs at 63.3 FPS and reaches a mAP equal to 80%.

4806-Different plant disease detection from UAV data using co-occurrence matrix and morphological transformation,
Samir Abdmoulah, Imen Cherif, Moez Bouchouicha and Sabeur Abid

Humanity depends heavily on agriculture. Identification of plant diseases is an important task to avoid food losses. Precision farming, or maximizing production efficiency through evidence-based practices is essential to meet the caloric needs of the 21st century. The knowledge gained from access to additional data allows farmers to eliminate guesswork, produce more and reduce waste of resources such as water, fertilizer, pesticides and labor. The aim of this work is to propose a new method allowing the early plant disease detection from an UAV images. The different plant leaves are automatically extracted and diagnosed using morphological transformation and feature extraction. The co-occurrence matrix is then, used to classify the different diseases. The proposed approach allows the computation of the percentage of the affected area and its localization. Simulation results, compared with several works, show that we can reach a good accuracy rate higher than 94.5%.

5261-Toward a robust Segmentation Module based on Deep Learning approaches Resolving Historical Cursive fonts Challenges,
Ilyes Ouled Omar, Sofiene Haboubi and Faouzi Benzarti

Historical documents are of major importance in conserving cultural and scientific heritage. In order to preserve this patrimony and to allow researchers from multiple fields to manipulate them, experts had opted to digitize these documents. In order to accelerate the process of classification while building logical connections between elements, the segmentation task should be treated carefully. Multiple non-textual blocks are presented within historical documents. Moreover, the non-consideration of the presence of columns generates major issues within the different processing stages.
Based on deep learning segmentation approaches, this paper introduces the opted design for text/non-text separation and columns segmentations tasks. Moreover, a novel segmentation approach dealing with cursive fonts is proposed. The accuracy of the text/non-text blocks segmentation accuracy is equal to 97.32%. The columns segmentation approach accuracy is equal to 93.26%.

5454- Toward an OCR Post-Processing Module based on LSTM cells Resolving Historical Databases Challenges,
Ilyes Ouled Omar, Sofiene Haboubi and Faouzi Benzarti

The historical Maghrebian font of the Arabic language had dominated in different countries. Thousands of cultural and scientific documents were written using this style. In order to develop an Optical Character Recognition system able to face this historical font challenges, post-processing module should be treated carefully, since its results affect directly the output. Due to the font cursive style and the presence of diacritics, the post-processing module presents multiple challenges within text reconstruction and lexical/

grammatical verification modules. With the use of deep learning architectures and sequential modelling, the development of lexical/ grammatical module becomes feasible. In this paper, we are going to reveal motivations and new developed architectures for the post-processing module, including the text reconstruction design able to order the classified segments and generate text output possibilities and the lexical verification design, employing Long Short-term Memory cells, able to process the different possibilities and generate the best text output. The accuracy value, within the Maghrebian font database, for both text reconstruction and lexical verification modules, is equal to 91.3%.
9560- Facial Expression Recognition based on HLBP, detection and correction skew of image, Imen Labiadh, Hassene Seddik and Larbi Boubchir

3254-Review on Quaternion Gradient Operator with Marginal and Vector Approaches for Color Edge Detection,
Nadia Benyoussef and Aicha Bouzid
Gradient estimation is one of the most fundamental tasks in the field of image processing in general, and more particularly for color images since that the research in color image gradient remains limited. The widely used gradient method is Di Zenzo's gradient operator, which is based on the measure of squared local contrast of color images. The proposed gradient mechanism, presented in this paper, is based on the principle of the Di Zenzo's approach using quaternion representation. This edge detector is compared to a marginal approach based on multiscale product of wavelet transform and another vector approach based on quaternion convolution and vector gradient approach. The experimental results indicate that the proposed color gradient operator outperforms marginal approach, however it is less efficient then the second vector approach

361- Localization for PMTTA algorithm at sport events: from concept to application,
Yosra Mlouhi, Lotfi Maalej, Mohamed Najeh Lakhoua, Imed Jabri and Tahar Battikh

Nowaday, database in economic and industrialarea are increasing at a very high speed and are regularly growing and creating a strong interest in automated summarization and semantic indexing of video content in diverse areas notably in teams sport. The aim of this paper is to proposed the Player Multi-Target Tracking Algorithm (PMTTA) that forms a recursive estimator of the complete formations including all player positions and this estimation is advanced to the time of the current measurement scan by predicting the locations according to a particular motion model.

5826- visible and infrared image fusion framework for fire semantic segmentation using u-net-resnet50 ,
Mohamed Tlig, Moez Bouchouicha, Mounir Sayadi and Eric Moreau

The forest fire represents a significant risk for many countries around the world. It often causes significant human, economic and ecological losses. Since only infrared images or visible images cannot offer accurate data and thanks to the technological advances of video-based fire detection systems, the fusion of visual and infrared images can play an essential role in fire detection. Therefore, the combination of visible and infrared images is valuable because it combines the benefits of thermal radiation data in infrared images and detailed texture information in visible images.
In this paper, first, we select two image fusion techniques to evaluate for the specific task of fire image fusion and compare the performance of infrared-visible fusion methods based on selected metrics of fusion performance. Second, we use the U-Net with pre-trained ResNet50 for the fire segmentation stage.
Finally, experimental results show that the proposed fusion stage before the semantic segmentation stage leads to better results compared to visible images only.

4820-Implementing Canny Edge Detection Algorithm,
Touka Hafsia, Hatem Tlijani and Khaled Nouri

In the field of image processing, edge detection of visual data is one of the most important operations of image processing research. This operation is very useful in many applications like object recognition, feature detection of image, motion analysis in computer vision field, etc. Canny detector is an algorithm of these operations of edge detection which constitutes more information about object to other edge detection algorithms. This work consists of a comparison study of image edge detection methods by focusing on the Canny algorithm to present the efficiency and perfection of this methods compared to other. Moreover an improved execution of this methods for blurred and noisy images Production systems and smart data 2

4521-Mathematical model for the maintenance activities scheduling in the case of railway remanufacturing systems,
Ayoub Tighazoui, Michael Schlecht, Roland De Guio, Bertrand Rose and Jürgen Kobler

In the railway technical centers, scheduling the maintenance activities is a very complex task, it consists in ordering, in the time, all the maintenance operations on the workstations, while respecting the number of resources, precedence constraints, and the workstations' availabilities. Currently, this process is not completely automatic. For improving this situation, this paper presents a mathematical model for the maintenance activities scheduling in the case of railway remanufacturing systems. The studied problem is modeled as a flexible job-shop, with the possibility for a job to be executed several times on a stage. MILP formulation is implemented with the Makespan as an objective, representing the time for remanufacturing the train. The aim is to create a generic model for optimizing the planning of the maintenance activities and improving the performance of the railway technical centers. At last, numerical results are presented, discussing the impact of the instances size on the computing time to solve the described problem.

3366- Overview of Analysis and Monitoring in Smart Hospital Systems,
Mohamed Najeh Lakhoua, Fatma Khanchel, Yosra Mlouhi, Lotfi Maalej, Imed Jabri and Tahar Battikh

Smart hospital system is original and complete hospital automation software that suites to approximately every hospital or medical institution from patient visits to operation to pathology test. The objective of this paper is to present an overview on analysis and monitoring in smart hospital systems. In fact, hospitals are required to do more with less, while also keeping speed with technology and patient expectations. Excellence in hospitals results, efficiency in the supply chain and improvement of the patient experience are the drivers behind developing medical facilities that meet healthcare needs now and in the future.

8425-Proposal of a Methodology of Analysis of Energy Meters Consumption,
Yosra Mlouhi, Lotfi Maalej, Mohamed Najeh Lakhoua, Jamel Ben Salem, Imed Jabri and Tahar Battikh

Traditionally, the reading techniques of the consumption of water, electricity or gas are made manually and suppose the passage of an agent in every home. In these conditions, a regular individual meter reading is necessary for a rigorous follow-up of energy consumption and it proves to be coercive and expensive to energy suppliers. Of their part, consumers, still worried of better services quality, oblige energy dispensers to choose intelligent and adaptable meters and indispensable communication systems in order to measure and to specify the consumption analysis. The objective of this article is to propose a methodology of analysis of the energy meters consumption. This is why a practical application has been achieved for the reading of the energy meters consumption. This application is going to allow energy dispensers to improve the clientele service while providing a precise and a real time invoicing.
7669- MS Windows Misconfiguration and vulnerabilities remedial for APT prevention and detection, Abdullah Said Al-Aamri and Imad Fakhri Taha

5032- A Machine Learning Clustering Algorithm for Sensorless reduced Device Multilevel Inverter based active power filter control,
Lazhar Manai, Mongi Besbes and Achref Rihani

In this paper, the objective is twofold such as the first is to reduce cost and control complexity by avoiding P.I regulators and optimizing measurement instrumentation while ensuring inverter capacitor voltage self-balance and the second is to provide a robust control strategy against power grid problems. Effectiveness of the machine learning control of reduced device multilevel inverter based active power filter control will be verified by numerical simulations as well as realistic experiments, and its merits must be justified by comparisons with other methods

8487-Smart Factory: key technologies for the implementation of the new industrial revolution Industry 40: A literature review,
Mohamed Khalil Krichi and Sihem Nasri

The Industrial Revolution or Industry 4.0 is a new generation of robotic, connected and smart factories. Indeed, the interaction of new technologies such as: the Internet of Things, artificial intelligence, the cloud, big data ... etc, is the challenge of the fourth industrial revolution. This new industry is emerging as the convergence of the virtual world, digital design,management (operations, finance and marketing) with the products and objects of the real world. It is in this context that the content of this paper presents a literature review of the industry 4.0. By describing the key features that enhance and transform a manufacturing system into a smart factory.

8050-Project Eirin : A Fast Paced Courier System Utilizing Every Integrated Railway in the Philippines,
Juan Miguel Abad, Jasper Enriquez, Mark Christopher Blanco, Dan Michael Cortez, Richard Regala and Antolin Alipio

The sudden strike of Covid-19 has brought many Filipinos to the brink of unemployment with a huge portion of the workforce being affected by the pandemic. In contrast to this, the rise of e-commerce and online businesses are notable when the pandemic started since individuals cannot leave home and now began to rely on digital shopping to purchase goods, which in turn increased the demand for logistical services, thus increasing the problematic traffic issues The Philippines already faces. An idea was proposed to utilize the railways as a new medium for logistics to travel on, but there are no proper navigation algorithms to fit the train system. This paper introduces Project Eirin, a logistics algorithm that allows rail passengers to become part-time or full-time couriers that deliver goods across the rail lines of the Philippines. The paper focuses on the proposed algorithm that aims to provide a backbone for an idealized system of metro railway logistics within the current Philippine railway transits available to aid the flow of logistics congested in road traffic. An algorithm was formulated tailored specifically to fit a train line's route with the necessary parameters like travel time, capacity management, and efficient package drop-offs, was simulated to show its planned functionality, and was compared with the A* pathfinding algorithm. Further study and development of Eirin is recommended alongside development of a program that can incorporate the algorithm and be applied for live test runs in actual train transportation rides.

3419-Traffic Jam in the Air: Visualizing and Modeling US Airline Traffic Delays with Tableau, Exploratory, and RStudio,
Mohamed Amir Omezzine

Flight delay is a problem that occurs every day in US airports. In 2007, nearly one in four airline flights arrived at its destination over 15 minutes late [1]. A flight is considered delayed when it arrived 15 or more minutes than the schedule. The air congestion is increasing daily which reached more than 87,000 flight per day

across the United State in one day Increasing travel delays varies from one airport to another in the US. Different causes such as security, weather and technical problems, are the main reasons for such delays. This paper analyzes a variety of delays causes for more than 20 airlines in the United States in 305 different airports in different states. In addition, an analysis of different type of data like departure delay time, arrival delay time, origin and number of cancellation due to weather, will answer different questions for travelers around the United States.A K-Means clustering model for the 20 airlines will be done using 14 different delay variables. Finally, a linear regression model for Chicago O'Hare airport arrival delay for the month of June will be explained

2564-The impact of integration wind turbine on the stability of the electricity Grid,
Taha Rachdi, Yahia Saoudi, Ines Mahmoud, Iov Florin and Ayachi Errachdi

The need of electricity enhancement poses a challenge for researchers. This issue can only be achieved with the challenge of the quality, the safety and the stability of the electricity system. This paper discusses the influence of wind energy integration on the safety of the electricity Grid. The integration of two wind turbines separately is proposed. Indeed, the first asynchronous generator used is the Doubly Fed Induction Generator (DFIG) while the second is a Squirrel-Cage Induction Generator (SCIG). The proposed Grid is an IEEE 14 bus. We proposed to use a Breaker device to intervene abruptly on integration of the wind energy. A comparative efficiency performance has been carried out by treating the active and reactive power, showing the dynamic angle and the evolution of the voltage. The simulations of these turbines gave good results. The simulation results found by the DFIG are better than the SCIG.

4458- Design and Implementation of an Evolutive Database of Photovoltaic Panels Measurements using LabVIEW NXG and SystemLink,
Houda Ben Attia Sethom

This paper presents and discusses the design and the implementation of a Database of PV panels voltage and current measurements starting from measurements acquired using National Instrument (NI) devices. The application, named Database of PV Panels (DPVP), is implemented using a connection between LabVIEW NXG and SystemLink. It could be used according to Online mode or Local mode. In this paper, the discussion will focus on the Online mode, which includes five functionalities. Theses functionalities were tested and validated using an experimental setup that includes 85Wc PV panels.

8990-Proposed of cyber security in Smart grids, Blockchain as solution,
Iliass Hammouti and Adnane Addaim

The existing electricity grid and smart cities enable two-way communications, and the big experiment is to improve the efficiency, reliability, economy, and sustainability of electricity generation, transmission, and distribution of the smart grid implementation. However, connectivity and management issues need to be addressed before you can take full advantage of the smart grid. In addition, how to describe the security challenges of the use of grid resources and available energy, how to ensure reliability and safety, and how to provide the capability to be considered when the data communication increase on smart grid systems. In this article, some descriptions of the smart grid, such as communications, demand response, and mainly security, are discussed. blockchain and the integration issues of distributed energy sources are also taking place.

7287-Improved Performances of a D-Statcom based on the Isolated Parallel-Interleaved Topology,
Mohamed Abbes and Marouen Mhadhebi

The objective of this paper is to synthesize a D-Statcom based on the parallel and isolated topology. Converter parallelization allows increasing the maximal power that can be delivered by the D-Statcom without changing the current or the voltage ratings of the used power modules. In the proposed configuration, DC links of the two converters are separated which offers a considerable attenuation of the undesirable circulating currents flowing between the two converters. The main contribution is to develop an innovative strategy to limit, as much as possible, the low frequency components of the circulating currents without adding current sensors at the output of each inverter . This strategy is based on balancing the voltages across the two isolated DC link capacitors. The performances are evaluated through simulation results.

9868- Evaluation of the Modeling of the Energy Solar Radiation over Three Stations in Tunisia,
Kaouther Belkilani, Afef Benothman and Mongi Besbes

More accurate data of hourly Global Horizontal Irradiance (GHI) are required in the field of solar energy in areas with limited ground measurements, The results obtained by using an existing model to estimate global solar radiation (GHI) applied in at three stations in Tunisia. These data are compared with GHI meteorological measurements. Some statistical indicators (R, R^2, MPE, and RMSE) have been used to measure the accuracy of the model. The numerical model provides the best performance according to statistical results in different locations in Tunisia.

8424- Extraction of monocrystalline silicon PV panel parameters based on experimental data,
Samia Jenkal, Mhand Oubella, Sana Mouslim, Mohamed Saidi Hassani Alaoui and Habiba Abouri

The aim of this work is to develop models that reproduce very precise current-voltage characteristic curves of photovoltaic panels (PV) regardless of the temperature and sunlight conditions, using an up-to-date and representative experimental database of the PV panel. This paper provides three classes of modeling and simulation of photovoltaic arrays and presents the synthesis results of the current-voltage characteristic performances obtained by the modeling approaches. The mathematical model is built using MATLAB/SIMULINK, and the database is used for the validation of these models under Moroccan meteorological conditions.

2020-Numerical Investigation of Heat Transfer Characteristics of Subcooled Flow Boiling in a Vertical Upflow and Downflow Minichannel,
Amal Igaadi, Rachid El Amraoui and Hicham El Mghari

The progress achieved in the high heat flux systems has required the development of an appropriate thermal management approaches to dissipate the high heat fluxes, especially for the small-scale devices. One of the most advantageous thermal management techniques is the utilization of subcooled flow boiling. In this work, the subcooled flow boiling of FC-72 in a minichannel is simulated using Ansys Fluent. The effects of pressure and gravitational orientations on the thermal transfer performances and pressure drop characteristics of subcooled flow boiling flow are analyzed for two cases of flow orientation: vertical downflow and vertical upflow flow in the same conditions of heat flux (q = 191553 W/m2), mass flux (G = 836.64 kg/(m2s)) and inlet temperature (Tin = 304.54 K). The predicted results demonstrated that the increase in system pressure improves the thermal performances of subcooled flow boiling and diminishes the pressure drop. The upflow vertical orientation is more advantageous than the downflow orientation due to the buoyancy force that moves the bubbles towards the direction of flow and leads to less chaotic liquid-vapor interactions.

7241- HMI for supervision and control of the production station of the FESTO MPS 500 system via Siemens WinCC software,
Nour El Houda Herarsi, Sidi Mohammed Meliani and Ahmed Hassam

Supervision, control and data acquisition for real-time management and monitoring of modern industrial systems has become a necessity nowadays. In this paper we first present the FESTO MPS-FMS 500 system and then we will present in detail the production station of this system. The main objective of this work is to develop a human machine interface (HMI) for this station. For that we will first study the functioning of this station and we will then model its functioning by the graphic language GRAFCET. Finally, we will develop the interface of this station via the SCADA software of Siemens WinCC Flexible. At the end of this article we will present several figures of the HMI in different modes of operation.

4320- Aerodynamic Study for the Purpose of Feasibility Design of a Double Rotor Wind Turbine,
Taoufik Zouaghi and Mounir Sayadi.

The aim of this study is primarily to carry out a design feasibility method of a wind turbine with a double rotor. Indeed, the wind turbines actually used must provide a maximum of power by exploiting the best available energy of the wind, with no damage on the environment. It unveils an optimal configuration of a chain of conversion wind turbine – Electric, with a double rotor in ensuring an improvement of power and performance of the system. Two structures of rotor are analyzed, namely, the two rotors are in the same line, and one before the other, which spacing varies between 0.67D and 1D; either the two rotors are in parallel and spaced 3D to 5D, one next to the other, in the face of the wind. Such a design would have as benefits, the increase in the aerodynamic performances of the wind turbine by optimizing the allocated space, as well as the compensation of the braking torque and the reduction of friction by heat exchange between the main axis of the multiplier and the air. For the sake of validation a numerical simulation study has been also carried out which has provided results that worth analyzing.

754-Learner Ontology-Based : Personalized and Gamified MOOCs to enhance retention rate,
Kawther Kaabi, Fathi Essalmi and Mohamed Jemni

Given its growth as an educational trend and the emerging research generated on the topic, the success of MOOCs has been called into question by low rates of participant retention and certification. One of the recurring criticisms of MOOCs relates to the fact that few learners complete the courses. This research tackled the problem of student retention from the analysis of the MOOC with a retention rate of 18%, it is an exception. To gain an empirical understanding of the problem, this finding has been widely studied to find ways to improve it. This article presents a new approach to improving the retention rate and the quality of learning in MOOCs by creating a new model to evaluate learners' retention rate in MOOCs. This approach allows for optimizing the selection of the personalization characteristics and presenting the contribution of the semantic web to personalized e-Learning systems and ends with a proposal for learner ontology in MOOCs.

7057-Monitoring attentiveness in learning activities,
Mariem Madder, Fathi Essalmi and Mohamed Jemni

The quick emergence of information and communication technologies “ICTs” has fueled the popularity of Electronic-learning “E-learning”. Assessing students’ attention states in distant learning environments is thus more difficult than doing so during face-to-face instruction. In this paper, we focus on a new domain of application of both ICT technologies and techniques in learning activities. The main goal is to propose a new architecture that evaluate and measure learner attentiveness while playing educational game in real time. The idea will be to quantify the level of attention, detect the low lever and indicate this situation.

9350- Learning personalization into MOOCs,
Jebali Baraâ, Ramzi Farhat and Mohamed Jemni

the number of subscriptions in MOOCs is growing at an accelerated rate. However, offering a common educational content to a large heterogeneous mass of learners does not necessarily meet their expectations and needs. Transforming the heterogeneous mass to sub homogeneous masses and personalize learning process in order to respond to these sub-masses needs is a potential solution.

4032-Tomato Leaf Disease Detection using Customized Transfer Learning Architectures and LSTM,
Sohel Rana, Rafeed Rahman, Mostafa Kamal Sagor, Md Saiful Islam and Mahady Hasan

Antioxidant Lycopene is enriched in tomatoes that possess massive health benefits such as reduction of risks related to heart disease and cancer. So we know that tomatoes are an essential part of the human diet and therefore their production occurs on a massive scale. However, in the case of mass production, manual detection of diseases in tomato leaves can be cumbersome. So we are proposing an automated detection system of the tomato leaf disease with the help of Computer Vision. For this research, we have applied proposed LSTM architecture, customized ResNet 50, Xception, 2D CNN, Inception ResNet V2 and Vgg 16 to detect the diseases of leaves from the images. The dataset that was used to train these models contains 14531 images possessing images of 10 different classes of leaf disease. The outcome of the training and testing of these models were visualized at the end for comparison. The accuracy reached by the proposed LSTM model is 95.79% whereas customized ResNet 50 architecture performed remarkably with accuracy reaching 97.70%, InceptionResNET V2 98.4%, and other proposed models performed similarly well.

7504-Augmented reality and image processing solutions for sport events and training, Yosra Mlouhi, Lotfi Maalej, Mohamed Najeh Lakhoua, Imed Jabri and Tahar Battikh

In this paper we present an overview on the application of image processing for sports competitions. Then, in the first application, we present the use of video during sports competition using a camera for tracking and identification of the players and experienced in various applications. In the second application, we propose a distributed real-time solution that has the aptitude to support the probabilistic fusion of diverse information sources, structure the incoming perceptions by automatically building models of the tracked players and adapting these concepts online. In the third application, we present a system solution for the virtual graphics, the projection of advertising images, logos, match scores and the distance measurements of players on the field may be overlaid on the plan of the diverse types of sports fields of real tested images.

3804-Sign Language Processing using Computer Vision,
Yosra Bouzid and Mohamed Jemni

Overcoming communication barriers and ensuring the exchange of information is important for people with hearing loss and contributes greatly to their social integration. Thanks to recent advances in computer vision, various applications based on sign language processing have been developed to meet the needs of these individuals in addressing the effects of their sensory disability on their daily lives, including correctly communicating information to them, for example by providing sign language interpretation of written text from camera images. In this light, we aim in this paper to provide a comprehensive review of the most recent approaches to sign language processing in computer vision, highlighting their advantages and limitations.

8274-Deep Learning Based Localisation and Segmentation of Prostate Cancer from mp-MRI Images,
Yahia Bouslimi, Takwa Ben Aicha Gader and Afef Kacem

Prostate Cancer (PCa) is one of the most common diseases in adult males. Currently, mp-MRI imaging represents the most promising technique for screening, diagnosing, and managing this cancer. However, the multiple mp-MRI sequences visual interpretation is not straightforward, and it may present crucial inter-

reader variability in the diagnosis, especially when the images contradict each other. In this work, we propose a computer-aided diagnostic system to assist the radiologist in locating and segmenting prostate lesions. As fully convolutional neural networks (UNet) have proved themselves the leading algorithm for biomedical image segmentation, we investigate their use to find PCa lesions and segment for accurate lesions contours jointly. We offer a fully automatic system via MultiResUNet [1] that was initially proposed to segment skin cancer. We trained and validated an altered version of the MultiResUnet model using an augmented Radboudumc prostate cancer dataset [2] and obtained encouraging results. An accuracy of 98.34% is achieved, outperforming the concurrent system based on deep architecture

2143-Flying objects Classification Using Trajectory Images and Convolutional Neural Network
Med Hedi Ouerteteni, Ahmed Zaafouri, Tijeni Delleji, Moez Bouchouicha, Zied Chtourou and Mounir Sayadi

In this paper, we present a new method for flying object classification and recognition based on trajectory images and deep learning approach. First, the video sequence is passed through a Gaussian mixture model (GMM) for flying object detection and tracking. Then the trajectories are determined by the different positions of the objects at successive frames. After that, we collect a large database of trajectories of two classes of objects: drones and birds. Then, the convolutional neural network (CNN) is applied to classify these objects into two classes. The LeNet5 is one of the best choice used in image classification. The CNN is trained using 80% of the database and the rest is used for testing. Experimental results are conducted to demonstrate the performance of the proposed method for drones and birds objects classification. In addition, the automatic approach helps and facilitate to military services to recognize drone from others objects.

817- Economic Power Dispatch with Transmission Lines Losses over Random Switching Communication Network,
Mounira Hamdi, Lhassane Idoumghar and Abdennaceur Kachouri

This paper is dedicated to solving the Economic Power Dispatch Problem (EPDP) in smart grids environment. A fully distributed algorithm is proposed to solve EPDP with transmission line losses over random switching communication network topology. The proposed approach is based on two consensus protocols running in parallel. The first algorithm is a first-order consensus protocol used to update the system incremental cost, while the second uses a gossip updating rule to estimate the local power mismatch to ensure the power supply-demand equality. This algorithm can handle network vulnerabilities such as random link/node failure, delay, and noise in transmission channels. Simulation performed on the IEEE 30 bus test system proves the effectiveness of the proposed algorithm.

3932-Reinforcement learning for antenna positioning,
Yassine Hachaichi and Houssem Mezzi

In this paper we study the position planning of cellular antennas. Informally, we try to find the best positions of antennas by having the maximum coverage and the minimum cost. Several methods were used to solve this problem. Since we have two main objectives, metaheuristics, such as genetic algorithms, simulated annealing, particle swarm optimization, … were used. In the recent era, artificial intelligence, and more particularly deep learning are compared to other methods in this context. Our work is about applying reinforcement learning on this problem. In this vein, we tried to tune the best reinforcement learning methods to solve this problem. We found that the SARSA agent with the EpsGreedy QPolicy is the best option for these kinds of problems.

4284- Automatic Arabic Dialect Identification Using Deep Learning,

Nejib Tibi and Mohamed Anouar Ben Messaoud

The language characteristics of a given community are referred to as dialect. Automatic speech recognition, e-health, and other applications benefit from being able to recognize dialect effectively. As a result, dialect identification has grown in importance and popularity as a study area. In this paper, we present an approach for automatic Arabic dialect identification based on language recognition system. It consists to apply the fundamental frequency, the energy, and the mel frequency cepstrum coefficients parameters based on multi-scale product analysis. These parameters are applied as input features to a convolutional neural network architecture for the classification of the dialect of speech signal. We can observe the efficiency of the application of multi-scale product to determine the characteristics of dialect. Our approach is evaluated on five dialect data set. The Experimental results show that the proposed approach outperforms several state-of-the-art methods, and is capable to identify the dialect.

6140-Speech Emotion Recognition based on Long Short Term Memory network,
Majd Al Hussain and Monia Turki-Hadj Alouane

Nowadays emotion recognition systems have regained importance in the field of Artificial Intelligent. In recent publications, emotion is extracted from several types of signals such as human facial expression, speech, electroencephalographs, gestures, etc. Recently, speech recognition systems are gaining interest in building monomodal systems or multimodal ones. In the current research paper, we introduce a speech emotion recognition system. The proposed system uses a Long-short Term Memory (LSTM) Network to extract emotion from speech features extracted from speech recordings after preprocessing. The RML dataset is used to experiment the performance of the proposed system. Compared to the state of the art, the proposed system has a relatively very low complexity and very interesting emotion detection accuracy. In particular, the use of the silence removal technique, and an efficient choice of few speech features, a bidirectional LSTM network with maximum ten timestamps achieved an emotion detection accuracy of 100% for the six considered emotions. Due to its low complexity and significant performance, the proposed speech emotion recognition system can be deployed for real-time purposes.

1242- The multiscale product's effect on the recognition of pathological voices,
Salma Chekili, Anouar Ben Massaoud and Aicha Bouzid

The objective of this paper is to investigate new parameters for the classification of organic, neurologic and functional pathologies. It's about calculating Mel Frequency Cepstral Coefficients MFCC among the speech multiscale product (MP) and not among the speech signal directly, the MP has a periodic structure for voiced sounds with high peaks at the glottal closure instants and null elsewhere. In this study, the Support Vector Machine classifier SVM was used for the classification of pathological voices of the MEEI database. The experimental results show that the classification rates obtained using MFCC features extracted from the multiscale product MP give better results than those derived from the speech signal.

4252- BAC TTS Corpus: Rich Arabic Database for Speech Synthesis,
Aissa Amrouche, Youssouf Bentrcia, Nabil Hezil, Khadidja Nesrine Boubakeur, Nawel Behloul and Abdelhak Noumeri

In corpus-based synthesis, a recorded speech corpus is one of its major components. The speech synthesis sound quality is affected by the quality and the coverage of the speech corpus in units' coverage and its representations, sentence length and corpus size are also factors. This study proposes an approach for designing Arabic corpus-based speech synthesis systems. This fact includes the study of the used criteria to design a corpus-based speech synthesis. To achieve our goal, a set of more than 5 million words have been collected in an initial corpus. To this end, various sources are collected, such as newspapers and the Arab

library Shamela. This initial corpus had been analyzed using: phonemes and words frequency occurrence to find out all high frequency phonemes and words to be used for designing the sentences of the speech corpus. A supervised phonetically balanced speech corpus of 202 sentences has been built, it consists of 6174 phonemes. The results show that the unit coverage in the corpus has a practical impact on the quality of perceived speech synthesis.

1833-Deep learning approach for sign language's handshapes recognition from EMG signals,
Amina Ben Haj Amor, Oussama El Ghoul and Mohamed Jemni

Electromyographic (EMG) signals are beginning to be increasingly used as alternatives for gesture recognition. Indeed, these signals are used to control machines (drones, robots, VR, PowerPoint presentation...). In the field of assistive technologies, EMG signals offer new solutions for people with disabilities. Namely, the control of prostheses for disabled people or the control of wheelchairs or computers for paralyzed people. Through this work we aim to use electromyographic signals for the recognition of sign languages' alphabets. The signals are received by 8 sensors mounted on an armband that the deaf person can wear on the forearm. We propose a new approach for the preprocessing of EMG signals and their classification using an approach based on new deep learning solutions. We used a sequence of convolutional neural network CNN layers followed by two Long-Short-Term Memory (LSTM) layers to extract features from EMG data. We implemented and evaluated the proposed approach using 28 handshapes representing Arabic alphabets. We obtained an average accuracy of 98,67%.

2040-Applying a Deep Learning Technique for Speech Recognition in Robotics,
Ameni Jellali, Ines Ben Fredj, Youssef Zouhir and Kais Ouni

In times of crisis, such as a pandemic, technological breakthroughs are more likely to occur. And this is what is happening in the world right now, where artificial intelligence and robotics are experiencing unprecedented progress encouraged by the countries. In this paper, we describe a system that gives a mobile robot the ability to perform automatic speech recognition (ASR) with multi speakers. So, it is necessary to conduct a thorough investigation into vocal recognition systems additionally deep learning techniques applicable to this field. In the context of this work, we will demonstrate the use of a Deep Learning technique for speech recognition that can recognize ten voices (yes, no, left, right, down, up, go, backward, forward, and stop). The voice command allows the mobile robot to be guided and controlled using the Raspberry Pi model B card and five DC motor drives. A real-time system was implemented and configured using an offline Wi-Fi network between software and hardware components. The whole system has been evaluated based on an English speech corpus trained and validated by native Arabic speakers for single words to assess real-time performance. As a result of this decreasing accuracy score, we have created a new database containing records of member s of our research laboratory. The results showed an accuracy of approximately 89.27 % of the accurate prediction of all ten voice commands.

5089-Energy Convergence and Telecommunications,
Boujemaa Nassiri, Amine Derraa, Najib Abekiri, Mohamed Maine and Yousef El Morabit

The objective of this work is to study and implement the advantage of new telecommunication technologies and the various technical solutions for the management of electrical energy, especially in the two phases: distribution and consumption

7452-Dual Band Quarter Wave Micro strip Antenna Design for Ka Band Application, Wahiba Belgacem, Belgacem Nassima, Oukil Souad and Amine Bab

In this paper, a new dual band (Ka) antenna design is proposed, it is featured with Rogers substrate overall size of 10.75x 20x 1.57 mm3, a dielectric constant of 2.2 and loss tangent of 0.009. then a rectangular slot is removed in the middle and two triangles in the patch sides, this miniaturization technics used to create dual resonance and to smeller the size of proposed antenna. The dimensions of the proposed antenna are calculated and optimized to adjust the return loss at the desired frequency. In the study parameters a new quarter-wave transmission line is used for adapting the feed line, and to improve the results obtained with CST software.
Image Processing 2

3151-Highly robust face recognition using reduced sampling matching pursuit kernel,
Zied Bannour Lahaw and Hassene Seddik

Kernel sparse representation-based classification (KSRC) represents one of the most interesting research areas in face recognition and identification. First, it applies dimensionality reduction method to decrease data dimensionality in kernel space and then employs the -norm minimization to reconstructing sparse signal. Various greedy recovery algorithms have been proposed to achieve a lower computational complexity compared to the optimal -norm minimization, while maintaining a good reconstruction accuracy. In this paper, we propose a new greedy recovery algorithm, called the Reduced Sampling Matching Pursuit (RSMP). Experimental results prove that the proposed classification method is efficient and robust against variations of illumination, expression, and pose on ORL and YALE database.

6261 - Fully Automatic Unsupervised Approach based on Adaptive Encoder Decoder Process for Forest Fire Image Denoising and Segmentation;
Rimeh Daoudi, Aymen Mouelhi, Moez Bouchouicha, Eric Moreau and Mounir Sayadi

Forest fire is a major problem that affect humans and natural resources. Early detecting forest fires in images depends on the appearance of the flame and smoke in the images, and their recognizing can help firefighters assessing the risk degree and monitor fires. Wildfire images resulting either from a fixed camera or a drone in motion are susceptible to noise. For good segmentation results a proper image analysis equipped with noise removal steps is often required.
In this paper, a novel technique for denoising and segmenting forest fires images is proposed. The presented methodology consists of denoising images with a new convolutional auto-encoder architecture then segmenting the output image with an adaptive active contour model. The method shows good results quantitatively and visually. The proposed denoising auto-encoder was trained and validated using a small dataset containing 450 images and succeed by removing the noise and also improving the brightness in the forest fire image, which leads to very promising segmentation results with a region-based active contour method.

4527 -An Auto-ANN for EMG Classification for the Motion Recognition of the Human Hand,
Sami Briouza, Hassène Gritli, Nahla Khraief, Safya Belghith and Dilbag Singh

Electromyography (EMG) signals can contain useful information related to the user's intentions. The usage of these signals for motion recognition has been widely studied in the last few years and can be used to control exoskeletons for rehabilitation or assistance. The aim of this study is to identify different motions using EMG signals, by using an automatic Artificial Neural Network (ANN). We apply our proposed architecture to the Ninapro DB2 dataset. This dataset contains information about 40 different subjects and 49 different motions divided into 3 types of exercises. The dataset is divided into 70% training, 15% validation, and 15% testing. The accuracy found for the model is 81.18% for exercise B, 77.76% for exercise C, and 91.70% for exercise D over 10 different subjects.

1833-Deep learning approach for sign language's handshapes recognition from EMG signals,
Amina Ben Haj Amor, Oussama El Ghoul and Mohamed Jemni

Electromyographic (EMG) signals are beginning to be increasingly used as alternatives for gesture recognition. Indeed, these signals are used to control machines (drones, robots, VR, PowerPoint presentation...). In the field of assistive technologies, EMG signals offer new solutions for people with disabilities. Namely, the control of prostheses for disabled people or the control of wheelchairs or computers for paralyzed people. Through this work we aim to use electromyographic signals for the recognition of sign languages' alphabets. The signals are received by 8 sensors mounted on an armband that the deaf person can wear on the forearm. We propose a new approach for the preprocessing of EMG signals and their classification using an approach based on new deep learning solutions. We used a sequence of convolutional neural network CNN layers followed by two Long-Short-Term Memory (LSTM) layers to extract features from EMG data. We implemented and evaluated the proposed approach using 28 handshapes representing Arabic alphabets. We obtained an average accuracy of 98,67%.

8008-Fine-Tuning ResNet-152V2 for COVID-19 Recognition in Chest Computed Tomography Images , Halima Dziri, Mohamed Ali Cherni, Fethia Abidi and Asma Zidi

The epidemic Covid-19 has spread to most countries of the world. This pandemic is due to an infectious disease, named by the World Health Organization SARS-CoV-2. In order to diagnosis this virus from 2D chest computed tomography (CT) images, we applied three different transfer learning algorithms: VGG−19, ResNet−152V 2 and a Fine-Tuned version of ResNet−152V2. The different transfer learning models are used on three hundred and four exams where 74 are normal cases, 60 are community Community acquired pneumonia (CAP) cases and 169 were confirmed COVID-19 cases. The best accuracy value is reached by the fine-tuned ResNet−152v2 by 75% against 70% for the basic ResNet−152v2 and 66% for the VGG−19.

2141- Early Detection of COVID-19 using CNN and ResNet-101 Architectures on Chest CT-Scan, Romdhane Hamida, Mohamed Ali Cherni, Fethia Abidi and Asma Ben Khedher Zidi

The main purpose of this paper is to classify if subject has COVID-19 or not base on chest CT-scan. CNN and ResNet-101 neural network architectures are used to identify the COVID-19. The experimental results showed that the two models can accurately identify the COVID-19 patients from others with good accuracies reaching 83.97 % for CNN and 90.05 % for ResNet-101 which demonstrates the good capability of the used models in the current application domain.

565- Image Processing Techniques in Optic Nerve's Images Analysis,
Amira Soltani

Nowadays, image analysis systems have proved a great interest in various fields such as image restoration. However, they remain until now much less explored in other fields such as the medical one. In this context, we will describe in this paper a computer-assisted system destined to the analysis of fundus images for the detection of an optic neuropathy called GLAUCOMA.

8534- Automatic Recognition System of Tunisian License Plates for Car Park Access Control
Hanene Sahli, Ahmed Fnaiech and Mounir Sayadi

This paper aims at highlighting the automatic approaches of recognition system of license plates to assure an appropriate access control of car park. After extracting the region of interest by the use of CNN-Mobile-Net-V2 method, a pretreatment step based on Gaussian Blur filter is applied to improve the plate image quality. The next step is reserved to the characters segmentation of the extracted plate and then

decomposing the binary image into sub-images each admitting a digit. The third phase addresses character recognition while using a set of training samples containing many models. For the characters prediction of the tested plate, the supervised learning approach support vector machine gives the greater precision when compared to other computer aided methods. Transforming the decomposed sub-images into alphanumeric information containing the plate number present the last phase. The proposed approach plays a significant role in enhancing the parking process in respect of control access.