CITISIA 2020



IEEE Conference on Innovative Technologies in Intelligent System & Industrial Application

CONFERENCE PROCEEDINGS

25 – 27 November 2020 Sydney, Australia



Welcome to the Conference on Innovative Technologies in Intelligent Systems and Industrial Applications 2020. It's my pleasure to help open the proceedings. I'm not a scientist myself. More of an enthusiastic amateur. But I love the energy of these events; of engineers and scientists challenging the limits of our knowledge and capacity. This year has taught us many lessons about ourselves and our society. One of these is how vital

technology and science are in solving our most pressing problems. We've never been more reliant on innovation. Think of how much of the next twelve months hinges on the success of vaccine researchers. Or how much rests on the ingenuity of renewable energy engineers. More than ever, our politics and technology should walk hand in hand.

Innovation is always exciting. Sometimes it's exciting because we know where it's heading; sometimes it's exciting because we have no idea where it will end. That's the nature of scientific inquiry – and it's the engine of progress.

Conferences like this play an important role. They're a chance to connect with other researchers. To talk about your projects. To learn from the work of others. To collaborate and grow.

It is my great pleasure, on behalf of the Shadow Ministry of Anthony Albanese, to declare the CITISIA conference open. Enjoy the conference and make the most of it!

Hon Tanya Plibersek MP



It is my great pleasure to participate in IEEE Conference on Innovative Technology in Intelligent System and Industrial Applications. The conference has been run successfully for a number of years, and I am delighted to see it continue despite the difficult conditions experienced during 2020. Since its inception, the conference has supported early career researchers to showcase their research and connect with each other and learn. The conference will

facilitate the exchange of innovative ideas through communication, networking and learning from others - for students, IEEE Chapters and Academics from Australia, the Asia-Pacific Region, USA, Europe, and the Middle East.

Charles Sturt University is committed to supporting research and innovation, and as such is proud to support this important event. Especially in this difficult year, it is fantastic to see our Study Centre students and researchers from around the world participating to make this event truly unique. I would particularly like to acknowledge and congratulate the Charles Sturt University Study Centre and Student branch of IEEE for organising such a wonderful event.

Professor Michael Friend Pro Vice-Chancellor (Research and Innovation) Charles Sturt University



It is with great pleasure that I congratulate Charles Sturt University (CSU) organizing the 5th IEEE CITISIA 2020 that promotes the innovation and inventive outcomes of our impacting force; university student community based on their projects culminated during their tenure within the university/institution/organization system.

The inaugural CITISIA was possible in 2007 due to the forming of IEEE student branch at Monash University Malaysia Campus

(MUMC) in 2006. Professor Robin Pollard, Pro-Vice Chancellor of MUMC during his tenure, provided financial, human, info and infra structures recognizing the value of university student community and their engagement to uplift socio-economic conditions of the living society. As the architect of CITISIA jointly with IEEE Robotics and Automation Society chapter, the first IEEE CITISIA was able to organize at MUMC grounds in 2007. This event was the first ever successful international conference together with IEEE Robotics and Automation exhibition organized at MUMC from its nearly decade installation as the first international private university in Malaysian soil.

When we formed the pioneering committees for the first CITISIA, we invited one of the most popular and recognized private university Multimedia University, Cyber Jaya main campus, Malaysia academic and student community with the great interest on organizing future CITISIA in alternate years under the main sponsorship of MMU and MUMC. Based on our mutual understanding in all aspects, we were able to organize four CITISIA conferences in the Malaysian beautiful capital.

I am glad to hear that the 5th IEEE CITISIA is organized with the main sponsorship of CSU by forming its IEEE CSU student branch at IEEE NSW section under the leadership of P. W. C. Prasad, Senior Member of IEEE, in conjunction with futuristic and visionary academic and student community in Sydney.

CITISIA today is more impactful to researchers, industries and the community than ever and it will be the successful domain of interest for future generations on this planet during this century and centuries to come due to emerging fields such as cloud computing, cyber physical systems, hybrid intelligent systems (synergy of natural and artificial intelligence) making the world a better place using nature friendly next generation smart devices built and to be built in the future.

I humbly wish a great success for the 5th CITISIA and the shining of the same in this decade within Australian soil.

Che &

SMN Arosha Senanayake M.Eng. (Computer Sciences in Engineering), PhD (Artificial Intelligence) Senior Member/IEEE, Founder CITISIA



I, on behalf of the NSW Section of IEEE, wish to congratulate Charles Sturt University on organising this "Conference on Innovative Technologies in Intelligent Systems & Industrial Applications" (CITISIA) under the difficult conditions that COVID-19 has created. The lack of face to face meetings of groups, within the NSW Section of IEEE, has made it particularly hard to network and organise contacts with those in industry.

I am confident that such a conference, even if under less than ideal conditions, will provide a unique platform for students, researchers and industry to share their experiences and views

on the latest research, as well as promoting future collaborative research and development activities.

The NSW Section of IEEE fully supports this conference, as it fulfils two of the aims of the IEEE. Firstly, a forum for like-minded people to meet and exchange views on topics of interest and secondly, advancing technology for the benefit of humanity. The Section also sees this as an opportunity for students to interact with those from industry and the wider world.

The NSW Section of IEEE wishes all participants a successful and fruitful conference, and that this will be the first of many that are held in Sydney.

Colin Elston Chair IEEE NSW, Australia

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Paper Title

1.	Research on Behavioural Recognition of patients using body sensors with the help of Deep Neural Networks in healthcare
2.	Smart Parking Utilizing IoT Embedding Fog Computing Based on Smart Parking Architecture
3.	Techno -economic Analysis for Implementation of Hybrid Renewable Energy System in a Rural Smart Village
4.	A study of fall detection monitoring system for elderly people through IOT and mobile based application devices in indoor environment19
5.	Web-based Enhancement of Employees Continuous Professional Development
6.	Wireless sensors networks using image processing for fire detection // 21
7.	Review of scalable privacy protection techniques in mobile crowdsensing service for security of data
8.	Design & Evaluation of Layout-Agnostic Tactile Guides for In-Vehicle Touchscreens
9.	Predictive analysis of the supply chain management using Machine learning approaches: Review and Taxonomy
10.	A review of data analytics techniques for effective management of big data using IoT23
11.	Analysing Stock Market's Trend Prediction using Machine & Deep Learning Models: A Comprehensive Review
12.	Enhanced the Quality of Telemedicine Real-Time Video Transmission and Distortion Minimization in Wireless Network
13.	A Novel Softmax Regression enhancement for Handwritten Digits Recognition using Tensor Flow Library
14.	Software Defect Prediction Using Atomic Rule Mining and Random Forest 25
15.	Use of Wearable Technologies for Analysis of Activity recognition for sports
16.	A Hybrid Method of Smart Scanning and Terrestrial Laser Scanner (SSaTLS): Improving the Accuracy of the Measurement Method 26
17.	Authentication in E-Health Services
18.	Bot Detection Using Machine Learning Algorithms on Social Media Platforms
19.	Predicting Early Phase of Type 2 Diabetic by Deep Learning28
20.	Visualizing Data Using Augmented Head Up Displays in Surgery28
21.	Computational intelligence in photonics technology and optical networks: a survey and future perspectives

22.	Review of Image encryption techniques using neural network for optical security in the healthcare sector – PNO System
23.	Deep learning for ovarian follicle (OF) classification and counting: displaced rectifier linear unit (DReLU) and network stabilization through batch normalization (BN)
24.	Cloud computing-based Elliptic Curve Augmented Encryption framework for Vehicular Ad-Hoc Networks
25.	Review of Face Recognition Techniques for Secure Cloud data surveillance using machine learning
26.	Overcoming security based risks of RFID tag using authentication techniques in the healthcare industry
27.	A DFC taxonomy of Speech emotion recognition based on convolutional neural network from speech signal
28.	Analysis of Algorithms in Automated Marking in Education: A Proposed Hybrid Algorithm
29.	A Novel Hybrid Fall Detection Technique Using Body Part Tracking and Acceleration
30.	Reverse Engineering UML Sequence Diagrams for Program Comprehension Activities
31.	Strategy-oriented Digital Transformation of Logistics Enterprises: The roles of artificial intelligence and blockchain
32.	Chromosome Encoding Schemes in Genetic Algorithms for the Flexible Job Shop Scheduling: A State-of-art Review Useful for Artificial Intelligence Applications
33.	RNN-CNN MODEL: A Bi-directional Long Short-Term Memory Deep Learning Network For Story Point Estimation
34.	Green Computing Sustainable Design and Technologies
35.	Maximum Power Point Tracking with Modified Incremental Conductance Technique in Grid-Connected PV Array
36.	Digital Energy Management amid the COVID-19 Pandemic in Mauritius 39
37.	Blockchain for data sharing in the rational use of coastlines and seaport demands in inter-organizational networks: Development of a new intelligent decision support system
38.	Towards Adapting Autonomous Vehicle Technology for the Improvement of Personal Mobility Device
39.	An evaluation model for Cloud-based Data mining Systems with Hadoop 40
40.	Detection of Chipless RFID Tag Using a Single Antenna RFID Reader System
41.	Study of Security and Privacy Issues in Internet of Things41

42.	Smart farm and monitoring system for measuring the Environmental condition using wireless sensor network - IOT Technology in farming. 43
43.	Application of Machine learning algorithms in diagnosis and detection of psychological disorders
44.	Mobile-Enabled Virtual Reality Visualisation Improves Learning and Training In Health Care
45.	Predictive analysis of the supply chain management using Machine learning approaches: Review and Taxonomy
46.	A Decentralised Land Sale and Ownership Tracking System using blockchain technology
47.	A Decentralised Registry for Firearm Tracking using Blockchain Technology
48.	Augmented Reality Navigation in Spine Surgery46
49.	Heart disease monitoring and predicting by using machine learning based on IoT technology46
50.	Classification of Melanoma (Skin Cancer) using Convolutional Neural Network
51.	Soft Real Time Data Driven IoT for Knee Rehabilitation48
52.	Proposing 2-tier Architecture for Permission-ed and Permission-less Blockchain Consensus Algorithms Based on Voting System48
53.	Abnormal Activity Detection in Healthcare
54.	A Review of Blockchain-based on IoT applications (challenges and future research directions)
55.	Content Caching and Clock Synchronization Assisted Low-Latency Communication in 5G Networks
56.	Post study of Blockchain in smart health environment50
57.	Human-System Interaction Interface Utilizing 3D Gesture Recognition Techniques based on Wearable Technology
58.	Convolution Neural Network for Brain Tumor Detection & Segmentation using Deep Learning Techniques
59.	IoT for Smart Learning/Education
60.	Using Machine Learning to Forecast Time Series in Spacecrafts 53
61.	MRI-based Diagnosis of Brain Tumours Using a Deep Neural Network Framework
62.	A Novel Solution of an Enhanced Error and Loss Function using Deep Learning for Hypertension Classification in Traditional Medicine54
63.	Convolutional Neural Network with Segmentation in Brain Tumour Diagnosis: An extensive review

64.	Digital Fiat Currency (DFC): A Taxonomy for Automatic Sleep Stage Classification
65.	Survey on Real-Time Tracking and Treatment of Infectious Diseases UsingMixed Reality in Visualisation Technique with Autoimmune Therapy55
66.	A Novel Augmented Reality Approach in Oral and Maxillofacial Surgery: Super-Imposition Based on Modified Rigid and Non-Rigid Iterative Closest Point
67.	DFA Taxonomy for the classification of ECG data for effective health monitoring using ML technology
68.	Enhancing Local Binary Patterns for higher accuracy in Fatty Liver classification using Deep Learning
69.	Motion Classification Using CNN Based on Image Difference58
70.	Automatic Camera Switching in Soccer Game using Decision Tree 58
71.	Strokes Classification in Cricket Batting Videos
72.	Investigation of Mobile Machine Learning Models to Preserve the Effectiveness of User Privacy
73.	Olitical Arabic Articles Classification Based on Machine Learning and Hybrid Vector
74.	Rule Based Approach to Extract Metadata from Scientific PDF Documents
75.	An Unsupervised Machine Learning Technique for Recommendation Systems
76.	Proactive Big Data Analysis for Traffic Accident Prediction61
77.	Improving the quality of education system using Data Science Technologies: Survey
78.	Comparison of 4G and 5G Cellular Network Architecture and proposing of 6G, a new era of AI
79.	Analyzing Vehicle-to-Everything Communication for Intelligent Transportation System: Journey from IEEE 802.11p to 5G and Finally Towards 6G63
80.	Towards Real-Time Drowsiness Detection for Elderly Care
81.	Enhanced Advanced Encryption Standard with Randomized S Box 64
82.	Text Analysis for Honeypot Misuse Inference
83.	Modelling Environmental Impact on Public Health using Machine Learning: Case Study on Asthma
84.	A Novel Solution for Anti-Money Laundering System
85.	Optimizing mutant generation for Lustre programs with multi-threading 66

86. A Comparitive Analysis of Existing	Methodologies of Legacy Application
Migration to Cloud	66

Technology doesn't change lives. People do.



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Collaboration

Research on Behavioural Recognition of patients using body sensors with the help of Deep Neural Networks in healthcare Syed Muhammad Raza Abidi

Abstract - The main purpose of this research work is to apply the different convolutional deep neural network techniques for the recognition of the different human activities taking place in the healthcare sectors by the use of the body sensors and devices. The primary aim of this work is to apply the feature extraction and augmentation processes for the behavioural recognition of different human beings. The research includes the use of deep recurrent neural network techniques (RNN). This research method is based on the review of the current framework and present a three-factor framework for the behavioral recognition of the humans. The research discuses about the BHR framework, which has the three components, namely, body sensor data, human activity extraction and recognition monitoring. This process will improve the performance as well as the prediction accuracies of the current mechanisms. A body sensor system has been introduced for the proper recognition of the human behaviour system in the healthcare systems. It carries out the ECG process for the different datasets in the proposed solution. The framework reviewed is a result of the reviews carried out based on which the initial issues are compared to the current solutions. The framework here suggested the outcomes of the extensive research carried out on the subject.

Smart Parking Utilizing IoT Embedding Fog Computing Based on Smart Parking Architecture

Amir Maharjan

Abstract

Rapid population growth and skyrocketing demand for private transportation bloom the market of automakers worldwide. The concept of automated parking system under smart city arises with the availability of the technology like fast internet connections, offloading computational resources, IoT devices communicating various devices each other, to uplift the quality of life. Revolution of cloud computing and ease of this technology also opens the door for better opportunities for smart parking where a system can be served from the remote area, but there is an issue with cloud computing for the cost of operation and latency of the services. In urban cities, there is the rapid growth of population and there is the advancement of automotive industries, there are lots of vehicles that are being used in all the cities which creates a lot of issues like road congestions, the issue in parking spaces. This paper proposes the fog computing architecture to reduce the latency and efficiently utilize all the available technologies together by building fog computing architecture network which is a multi-tier structure where applications run jointly, communicates and compute with each other. Smart parking has gained massive attention due to ease and outcome from those technologies are

exponential. The role of Internet of Things and fog computing enables the platform to minimize the take duration for finding the parking space, this reduces the time and excess use of fuel and emission of CO2, these are the consequence of over and unmanaged vehicles in the urban areas and unmanaged parking areas.

Techno -economic Analysis for Implementation of Hybrid Renewable Energy System in a Rural Smart Village Saroj Pyakurel

Saroj Pyakure

Abstract

With the overwhelming use of non-renewable energy resources, the energy crisis is imminent as these sources are depleting and limited. Furthermore, burning fossil fuels create a huge amount of carbon emission that has increased pollution. To eliminate environmental pollution using fossil fuels, the World is focusing on clean energy development that uses hybrid renewable energy resources (HRES). This paper aims to analyze existing solutions for the optimization of HRES based on the techno-economic analysis in remote areas of the World. This work seeks to find the best optimization and sensitivity analysis method to achieve the optimal hybrid system. Several papers will be reviewed to compare and find improvements for the existing hybrid systems. The techno-economic analysis of the HRES is realized by choosing the best algorithm among Particle Swarm Optimization (PSO), Genetic Algorithm (GA), or using the best software (HOMER PRO) for simulations. The study covers several configurations of energy resources, control strategy optimization analysis, and environmental effect evaluation. This paper presents a collective study of several algorithms, techniques, and tools, comparing to find advantages and limitations with an analysis of the collective single improved solution. The results from the comprehensive review of papers reveal that the optimum system has the highest penetration of renewable energy, the lowest net present cost (NPC), the least Levelized cost of energy (LCOE), and the lowest amount of carbon emissions. For a load profile in a rural village, a proper selection of energy resources, control strategy, energy management, input parameters, type of materials, method, and tools of optimization are vital to implementing HRES with Technoeconomic analysis.

A study of fall detection monitoring system for elderly people through IOT and mobile based application devices in indoor environment Padam Gharti

Abstract

This research presents the structure and framework for identifying falls by remote observing of old individuals in indoor environments by taking advantages of the Internet of things as well as mobile-based applications. This smart framework identifies fall occurred to older individuals who are living alone or living in residential nursing homes. To monitor the fall, it uses realtime monitoring by use of open-source camera and wearable devices. The system is carried out by pose recognition and object detection method for identifying the object taken by an open-source camera. A systematic review was performed using the Primo Search tool for finding eBooks, articles, and journals from the CSU library database. To provide a high efficiency using this information all inclusion criteria were meet by choosing the journal article which was closely related to the topic. The proposed study of fall detection monitoring system for older people living in geriatric residents allows data for caregivers and clinicians to provide better control in monitoring the health status of older patients and allows closer communication with the patients' family members and relatives. This study can be used as an approach for improving the cost of care in elderly population.

Web-based Enhancement of Employees Continuous Professional Development

Chamadi Withana, Jonathan Lavaro and Amr Elchouemi (CSU)

Abstract

The abstract of this paper is to identify the factors that will help improve employee performance through continuous professional development in organizations. The study includes research articles that express the current continuous professional development factors in organizations and to identify the problems faced by employees with regards to their continuous professional development. Structured System Analysis and Design Method (SSADM) was used for analyzing the data and processes in the research. In particular, SSADM was used to gather requirements for the research, analyze the data, design the proposed solution, implement the solution and test the proposed solution. The key findings of the research help to understand the importance of continuous professional development factors and how those factors affected the development of employees in the organizations. This study will be useful for employers to understand about the continuous professional development factors as well as for the organizations to implement a new solution with proposed factors to enhance employees' performances. This study yields important suggestions for the employers to develop continuous professional development programs in the organization. The paper tries to focus on employee's continuous professional development and its linkage between organizational progress. The study contributes to the employee's performances development within the organizations as well as organizational improvement.

Wireless sensors networks using image processing for fire detection Mohammad Momani and Zaighum Ateeq

Abstract

Wireless Sensor Network (WSN) is an influential technology predominantly suitable for eco-friendly monitoring. It provides a low-cost fine-grained detection of hazardous wildfire locations like urban interfaces. Compared with early forest techniques of fire detection, some of the systems are less effective and early prevention system for indications of forest fire is necessary. There is a need for a quick response to the fire detection in hazard and WSN is used to provide a systematic gateway for detection of exact fire location and spreading location. Flame identification based on image processing has been widely used in fire detection. The purpose of this work is to propose a system based on WSN using image processing for fire detection. Remote Image data, segmentation and evaluation is the taxonomy used in this research work that defines each of the necessary components used to implement a fire detection using WSN. It is proposed that the component of the proposed taxonomy is used for the validation criteria. For implementing the WSN system for fire detection using image processing. The solution will act as a pool for the user to understand the necessary elements of WSN for the fire detection system.

Review of scalable privacy protection techniques in mobile crowdsensing service for security of data

Mohammad Momani and Jinfeng Su

Abstract

Mobile crowdsensing is a service based on a group of different individuals that have a device. The MCS (Mobile crowdsensing) is used for communication and transferring of data. It is capable of sensing and computing such data that are based on some information such as measuring, mapping, analyzing, and estimating. It can be used for effective decision-making in-crowd. The data generated in by crowd is used for task generation, and the task is assigned to different users and requesters. Due to numerous jobs, there can be a situation of task similarity generates, which may affect the privacy of users or workers in crowdsensing. The problem of privacy can be solved with the help of privacy protection techniques in crowdsensing. This work aims to propose a system based MCS technique for Privacy protection of data with proper scalability. CPP (Crowdsensing Privacy Protection) taxonomy is used that is based on the comprehensiveness and fitness of good. The usefulness of the proposed arrangement is explained by ordering 30 state-of-the-art solutions. Improved consequences are based on extraordinary assets and diminish of different MCS privacy protection techniques. It can be concluded that by employing the MCS privacy protection system for securing user data

based on detection and learning algorithms with accurate dimensions. This research investigates the current innovations and techniques in the field of MCS for scalable privacy protection. Different relevant algorithms are used for effective decision making for users and requestors of MCS.

Design & Evaluation of Layout-Agnostic Tactile Guides for In-Vehicle Touchscreens

Sarmad Soomro and Andy Cockburn

Abstract

Touchscreens are commonly used to provide access to a wide range of vehicle functions. However, interacting with touchscreens can require more attention than physical controls due to their lack of tactile sensation, potentially causing driver distraction. Prior research has indicated that stencils overlays mounted on a touchscreen can ease these problems. However, the previous stencils studies used holes that were cut to the size and location of underlying interface controls, meaning that they could only be used with a single interface layout, which is unrealistic for typical in-vehicle use. In this paper, we examine the use of layout agnostic stencils that can be used with different user interface layouts, with the aim of reducing visual attention on the touchscreen while driving. We conducted an experiment in which two layout agnostic stencil designs were evaluated in comparison to a normal touchscreen during simulated driving. Contrary to our intention, the new stencil designs increased attentional demands and impaired driving performance compared to the normal touchscreen. To understand the causes of this failure, we developed a framework for understanding low-level human activities while interacting with in-vehicle controls. The framework suggests the need for improved understanding of the acuity of the human proprioceptive target approach and of the human ability to discriminate between tactile objects.

Predictive analysis of the supply chain management using Machine learning approaches: Review and Taxonomy

Xuan Vy Pham1, Angelika Maag and Suntharalingam Senthilananthan

Abstract

Currently, there are many literature reviews on the application of predictive analytics in Supply Chain Management (SCM). However, most of them focus only on some specific functions in supply chain management, including Procurement, Demand Management, Logistics and Transportation, or purely technical aspects. The purpose of this paper is twofold: first, it aims to provide an overview of the outstanding supply chain management functions (SCMF) that apply predictive analytics; and second, to highlight practical approaches, algorithms, or models in SCM via a comparative review of machine learning approach for aspect-based predictive analysis. For these purposes, details of relevant literature were gathered and reviewed. Accordingly, this article will present the data, algorithms, and models applied in predictive analytics along with its performance, SCM result taxonomy, which includes all the necessary components in the effective implementing of SCMF. Via the result of the recent related publications and papers (2018 – 2020), Demand management and Procurement are the two main areas of SCM, in which predictive analytics is often applied. Particularly, accurate demand forecasting and sensing (Demand management) and sourcing risk management and supplier selection (Procurement) are among the foremost applications of BDA-enabled predictive models. This taxonomy not only helps scientists to have a steppingstone to provide more valuable articles in the future but also allows manufacturers to gain an in-depth understanding of these elaborate scenarios and better manage the supply chain management functions (SCMF) via the application of predictive analysis.

A review of data analytics techniques for effective management of big data using IoT

Owais Khalid1, Angelika Maag and Suntharalingam Senthilananthan

Abstract - IoT and big data are energetic technology of the world for quite a time, and both of these have become a necessity. On the one side where IoT is used to connect different objectives via the internet, the big data means having a large number of the set of structured, unstructured, and semistructured data. The device used for processing based on the tools used. These tools help provide meaningful information used for effective management in different domains. Some of the commonly faced issues with the inadequate about the technologies are related to data privacy, insufficient analytical capabilities, and this issue is faced by in different domains related to the big data. Data analytics tools help discover the pattern of data and consumer preferences which is resulting in better decision making for the organizations. The major part of this work is to review different types of data analytics techniques for the effective management of big data using IoT. For the effective management of the ABD solution collection, analysis and control are used as the components. Each of the ingredients is described to find an effective way to manage big data. These components are considered and used in the validation criteria. The solution of effective data management is a stage towards the management of big data in IoT devices which will help the user to understand different types of elements of data management.

Analysing Stock Market's Trend Prediction using Machine & Deep Learning Models: A Comprehensive Review

Doan Yen Nhi Le1, Angelika Maag and Suntharalingam Senthilanantha

Abstract

The applications of intelligent financial forecasting play an utmost important role in facilitating the investment decisions activities of many investors. With the right insight information, the investors can tailor their portfolio to maximise return while minimising risks. However, not every investment guarantees a good return, and this is mainly because most investors have limited information and skills to predict the stock trend. Nevertheless, the complex, chaotic and volatile nature of the stock market make any prediction attempts extremely difficult. This paper aims to provide a comprehensive review of the exiting researches which related to the application of Machine Learning and Deep Learning models in financial market forecasting domain. To prepare for this project, more than sixty research papers were analysed indepth to extract required quantitative information, applications, and results on different methodologies. It is found from this project that Deep Learning outperformed Machine Learning in all the collected research papers, and it is the most suitable methodologies to apply to the stock market forecasting domain.

Enhanced the Quality of Telemedicine Real-Time Video Transmission and Distortion Minimization in Wireless Network

Ajay Ghimire; A/prof (Dr) Abeer Alsadoon; P.W.C. Prasad; Nabil Giweli; Oday Jerew; Ghossoon Alsadoon

Abstract

Achieving good quality and minimum distortion of the video frames is one of the most challenging requirements in the telemedicine system. Transmission process for a real-time video over the wireless network is due to various realtime restrictions, such as encoding mechanism, noise, and bandwidth fluctuations. The restrictions introduce distortions and delay, hence adversely affect the reliability and quality of the video transmission system. This study aims to propose a new system which can fine-tune the encoding process dynamically. The proposed system consists of an Enhanced Video Quality and Distortion Minimization (EVQDM) algorithm to achieve guaranteed quality, minimum distortion, and the minimum delay in the transmission of the video. This system guarantees the video quality by using the adaptive video encoding technique and minimizes the distortion by considering the truncating distortion in the enhanced distortion minimization algorithm. The results of applying the proposed EVQDM algorithm and the state-of-the-art solutions are compared, and it was shown that the proposed algorithm improved the state-of-the-art solutions. Video quality has been increased from 47.2 dB to 50.13 dB, Video distortion has been minimized from 0.6802 to 0.3509 and the end-to-end delay has been reduced from 123.58 ms to 112.57 ms. The proposed solution focuses on truncating distortion, to minimize the total distortion of the video. For summarization, this solution solves the issue of achieving minimum distortion and delay while providing the guaranteed video quality within the boundaries of the real-time constraints that are imposed on the system.

A Novel Softmax Regression enhancement for Handwritten Digits Recognition using Tensor Flow Library

Aman Arora; Omar Hisham; Teaba Khairi; Tarik Rashid

Abstract

Background and Aim: Handwritten Digits Recognition has a wide variety of applications in postal mail ordering, phone records search, automatic car number plate recognition and in the medical sector that observed how the Machine Learning makes the daily tasks simpler and more efficient. The aim of this paper is to improve the classification accuracy of existing handwritten digits systems, thus improve their efficiency. Methodology: The proposed system consists of an enhanced decision function by adding a "Bias Probability" Function. The function adds negative weights to the output classes (0-9) that have high positive bias and add a positive weight to the output classes that have a high negative bias in order to neutralize the effect this high negative bias. Therefore, Bayesian Classifier function has been enhanced thereby improving the accuracy of classification, which will further improve the performance of the multiclass probability categorisation. Result: An increase of 5.6% was observed in the overall accuracy of handwritten digit's classification using the Modified National Institute of Standards and Technology (MNIST) Dataset. Conclusion: From the results, it is clear that the proposed system, enhances the main decision function to further improve the accuracy with no significant increase in the processing time.

Software Defect Prediction Using Atomic Rule Mining and Random Forest

Suroj Thapa; Thair Al-Dala'in; Abeer Alsadoon; P.W.C. Prasad; Tarik Rashid

Abstract

This research aims to improve defect prediction in terms of accuracy and processing time. The new proposed algorithm is based on the Random Forest Algorithm that classifies and distributes the data based on tree module. It has value either 1 for defective module or 0 for the non-defective module. Random Forest Algorithm selects a feature from a subset of features which has been already classified. Random Forest Algorithm uses a number of trees for the prediction. For this research, datasets were tested with 10 and 15 sets of trees. Results showed an improvement in accuracy and processing time when the proposed system was used compared to the current solution for the software defect model generation and prediction. The proposed solution achieved an accuracy of 90.09% whereas processing time dropped by 54.14%. Processing time decreased from 19.78s to 9.07s during the prediction for over 100 records. Accuracy was improved from 89.97% to 90.09%. The proposed solution uses Atomic Rule Mining with Random Forest Algorithm for software defect prediction. It consists of classification and prediction process by using

the Random Forest Algorithm during storing data that is carried out using Atomic Rule Mining.

Use of Wearable Technologies for Analysis of Activity recognition for sports

Thair Al-Dala'in; Anil Sharma; Ghossoon Alsadoon(AMAIUB); ALI ALWAN

Abstract

Activity recognition and enhance performance are the major issues that are faced by wearable technology devices. Therefore, in this paper, we present an exploratory study to examine and evaluate the current issues with wearable technology for analysis of activity recognition for sports. These issues can be controlled by implementing a high sensor and WSN technologies using components such as – Stimuli signal, Data recognition and analysis, and Physical testing. The study utilised the verified taxonomy based on wearable technology, which aims to use effective technology. Raw and processed data has been gathered from different sources. The study shows that there is a major gap in the previous research studies and most of the studies only investigated some of the component of the Wearable Technologies for Analysis of Activity recognition for sports which make it inefficiency for current researchers.

A Hybrid Method of Smart Scanning and Terrestrial Laser Scanner (SSaTLS): Improving the Accuracy of the Measurement Method Abeer Alsadoon; Indra Seher; P.W.C. Prasad; Tarik Rashid; Paul Manoranjan

Abstract

This research aims to evaluate and enhance the accuracy and processing time of image processing methods through Laser Scanning. Additionally, it explains the limitations of 3D scanning and rendering. The research focuses on enhancing the accuracy of rendering images and reducing processing time. This is achieved, firstly, through a review of relevant literature dealing with creating methods which will optimize the structure of the captured object by changing a mesh object to a point cloud. This is designed to support construction sites, indoor and outdoor, by increasing both the speed of the 3D model rendering and the outcome in terms of precision. Based on these findings, a faster and more secure construction environment can be produced. During the research process, the main finding concerns 3D Scanning and Printing since these processes need to lead to higher accuracy and acceptable processing times. The 3D object can be generated from Smart Scanning to form point clouds which constitute the first look of that object. This goal was reached since this method can reduce the processing time while maintaining higher level of accuracy. The hybrid solution contributes a more stabilized visualization in Laser Scanning, not only for indoor lab experiments, but also for outdoor field tests. The flexibility added by the algorithm plus the range of technical support allow the Laser Scanners to produce high quality visualizations in all fields.

Authentication in E-Health Services

Margaret Redestowicz; Sabin Shahi; Nectarios Costadopoulos

Abstract

E-health services are a modern technology that stores the health records of patients and allows medical practitioners to retrieve them remotely. E-health services have provided high-level availability and good support for medical services, but a secured authentication mechanism is vital for the protection of this sensitive information. The main concern for e-health services is that the information is transmitted through a public transmission medium and the existing authentication mechanism fails to secure the user identity and is vulnerable to different network attacks. The main aim of this paper is to provide a review of different types of authentication mechanisms used in ehealth services along with their implemented technologies and provide an overall framework for future research. This report will compare and contrast the currently available authentication mechanisms of e-health services along with their data input, processing, outcome, and the recent technologies implemented in the system. Through this report, the reader will be able to gain an overview of all the existing authentication protocols based on their techniques, methods, and algorithms for improving the security of e-health services and to secure the patient data.

Bot Detection Using Machine Learning Algorithms on Social Media Platforms

Sainath Gannarapu; Ahmed Dawoud; Rasha S. Ali; Ali Alwan

Abstract

Using bots in social media is a significant concern for information validity and authenticity. Currently, there are several solutions for bot's detection. However, the accuracy of the detection still needs improvement. The main aim of this paper is to introduce an automatic mechanism for the detection and removal of bots that exist on social media platforms. The research has the purpose of removing the non-genuine accounts, their related information, and the data which are posted by them and to make these platforms free of misleading information. Bots detection and removal will increase the authenticity of the contents presented on different social media platforms. Also, It will improve the level of privacy and authenticity of these platforms and related users. The research uses the bot detection technique based on machine learning algorithms. The components of the study are data, feature selection, and bot detection. The research performs web development and hosting on the collected data with a machine-learning algorithm to perform bot detection in social media networks. The proposed system provides a more accurate and effective system for bot detection using machine learning. The research utilizes various approaches and mechanisms that lead to the enhanced efficiency of bot detection and removals.

Predicting Early Phase of Type 2 Diabetic by Deep Learning

Prabir Pathak, Amr Elcouemi

Abstract

Deep Neural Network with prediction is the one of the main deep learning technologies which is been used to researched for early prediction of Type 2 Diabetics (T2D). However, some of the deep learning techniques have been introduced for early prediction of the T2D. For the prediction of the Type 2 Diabetic, the taxonomy with the components are proposed with Data, Prediction processing and Display (DPD). Those components are evaluated for the better performance of the system and are validated with the different parameters for the early diagnosis of the T2D. The system being proposed has the higher accuracy for the prediction of the T2D and early detection of the diabetics in different age group in comparison to research paper reviewed and with current findings. It also helps to diagnosis the diabetics in the patients. The critical analysis of the literature review of the latest published research paper available on the T2D and on deep learning which has better accuracy for the prediction of T2D. On basis of the analysis, an effective system for T2D based on Deep Neural Network (DNN) has been developed in the system that can predict the diabetics in the early stage.

Visualizing Data Using Augmented Head Up Displays in Surgery

Arman Suryadi

Abstract

Several issues, circumstances and hurdles regarding the existing and the possible vulnerabilities in the medical field i.e. surgical field specifically has been a matter of concerned and discussion since years. The risk and disadvantages that might come along during surgery is unavoidable and there are evidences of numerous surgical accidents leading towards death. To mitigate these vulnerabilities, augmented wearable devices were introduced. One can see lots of improvements and success in the field of surgery with the help of these wearable devices. However, shortcomings and limitations still exist in even with these devices. The main objective of this research paper is to point out the specific issues that comes along with the use of these wearable devices and analyses the root cause behind this. Numerous journals, articles and papers were thoroughly read, analyzed and evaluated in order to find the possible solution. Different kinds of issues were figured out on the references of the journals out of them some were complicated. I have collected lots of information and data to analyses the importance and the magic these devices have done so far in the field of surgery. Along with the achievements, I have figured out some difficult issues and circumstances as well. After analyzing all these papers, I came to the conclude that there are lots of works researchers are still doing for the upliftment and betterment of these devices in the field of medicine.

Keywords: Wearable Devices, Head Up Display, Surgical Room, Augmented Reality, Surgery.

Computational intelligence in photonics technology and optical networks: a survey and future perspectives

P.W.C. Prasad ; Gigi Varghese ; a ray

Abstract

Increased use of internet services require the implementation of optical networks for increasing the reliability of the services efficiently. The optical network requires managing available bandwidth and components to manage the functional complexity of the network. Photonic technology helps in optimising the network designing that increases the complexity of the network. Computational intelligence is the technique that can be implemented in the optical network for reducing the complexity of different applications of photonics technology.

The main aim of this study is to realise the photonic technique in optical network-based infrastructure to resolve different optimisation issues. This research is focused on identifying an efficient computational intelligencebased mathematical model that can be implemented in the optical network for obtaining high-performance computing. Network environment, optical communication, and optical performance monitoring are the major components required for developing the system for optical networks. Evaluation and description of these components help in developing a required photonic based optical network that helps in reducing the complexity of the system in computational intelligence. Classification of the developed system helps in identifying the computational intelligence technique to be implemented in photonic technology for increasing the efficiency of the optical network.

Keywords: Computational intelligence, photonics, optical networks, networking, communication

Review of Image encryption techniques using neural network for optical security in the healthcare sector – PNO System George Zajko; Jinfeng Su; HENDRA KURNIAWAN

Abstract

Image encryption is used to encrypt patient images that contain diagnostic information about patients in healthcare. The healthcare sector uses electronic media to support the transmission of scanning results, such as Xrays, MRI scans and ultrasound images. The primary purpose of this paper is to investigate encryption of images through techniques utilising neural networks to maintain security and privacy of patient records. Patient image data, neural network-based encryption, and optical security (PNO) systems are examined in this research work. These components will provide some validation in the use of neural network-enabled image encryption in healthcare. The evaluation of the PNO system is based on different quality factors, which are compared in a classification of the 30 state-of-the-art solutions in image encryption. The effectiveness of the encryption process can be increased in terms of high accuracy, less noise and enhanced security. We conclude that using neural network-based encryption techniques can increase security in visual media in the healthcare sector.

Deep learning for ovarian follicle (OF) classification and counting: displaced rectifier linear unit (DReLU) and network stabilization through batch normalization (BN)

Salma Hameedi Abdullah; A/prof (Dr) Abeer Alsadoon ; P.W.C. Prasad; Mekhriniso Abdukodirova

Abstract

Background and aim: Diagnosis and treatment of female infertility conditions would help future reproductive planning. Although current deep learning frameworks are able to classify and separately count all types at high accuracy, these solutions suffer from a misclassification error and a high computation complexity due to a positive bias effect and an internal covariate shift. The objective of this paper is to increase the classification accuracy of the WSHI of OFs and to reduce the computational costs of classification via deep learning (DL). Methodology: our framework for follicle classification and counting (FCaC) uses filter-based segmentation. A new method is also proposed to accelerate learning and to normalize the input layer by adjusting and scaling the activations. Our method uses a modified activation function (MAF)- displaced rectifier linear unit (DReLU) and batch normalization (BN) in Feature Extraction and Classification. Therefore, faster and more stable training is achieved by modifying input distribution of an activation function (AF). Results: The proposed system was able to obtain a mean classification accuracy of 97.614%, which is 2.264% more accurate classification than the state-of-the-art. Furthermore, the model processes a single WSI 30% faster (in 10.23 seconds compared to 14.646 seconds processing time of the existing

solutions). Conclusion: The proposed system focuses on processing histology images with an accurate classification. It is also faster, has an accelerated convergence and enhanced learning thanks to BN and the EAF. We considered a positive bias effect and internal covariate shift as the main aspects to improve the classification performance.

Cloud computing-based Elliptic Curve Augmented Encryption framework for Vehicular Ad-Hoc Networks

Rahul sharma; Louis Hourany

Abstract

The purpose of this research work is to develop a framework, which can provide message authentication for communication that occurs in a vehicular network. The main aim of the research work is to provide a high level of security and encryption for the messages that are being transferred in the vehicular network. The networks are provided with augmented encryption scheme with different approaches to have secure and private communication. The research is based on the Cloud computing-based Elliptic Curve Augmented Encryption framework for Vehicular Ad-Hoc Networks. The research for this project is done with the help of the VEA (VANET network data, Elliptic encryption, Authenticated messages) framework. The given system provides more efficient and accurate system architecture for the communicating messages in the vehicular ad hoc network with the help of different approaches for performing the encryption on the messages that are being transferred. This encryption architecture leads to increased security in the system. State of the art had comparatively lower accuracy in communication. The utilization of various algorithms for providing the encryption to the messages resulting in the increased authentication in communication and improves the efficiency and accuracy of the solution. The research has the goal to provide high-level security architecture for message authentication with accuracy, sensitivity, specificity, computation and communication with the help of encryption algorithms.

Keywords: VANET, encryption, privacy, authentication, verification, keys, vehicle, trusted authorities"

Review of Face Recognition Techniques for Secure Cloud data surveillance using machine learning

Charanya Ramakrishnan; Saikrishna Muddala

Abstract

Face recognition techniques are used in the cloud environment for securing the cloud data from intrusion activities. Face recognition techniques help detect any kind of intrusion activities and in protecting cloud data from intrusion activities. Face recognition techniques help extract and secure the information embedded into cloud data by using different machine learningbased methods. In a cloud environment, recognition techniques can be used in identifying accurate information from the image as well as speech signals. Machine learning and deep learning-based techniques help increase the accuracy of recognition in the cloud environment. The main aim of this research is to identify efficient face recognition techniques that can be implemented in the cloud environment for securing data stored on the cloud network. Cloud data, behaviour detection, and recognition are the major components that help develop an efficient system to be implemented in a cloud environment for achieving secure data surveillance and to secure data stored on the cloud environment from any network intrusion activities. Analysis and evaluation of these components help in developing an efficient system based on machine learning techniques that help in recognizing different activities and in detecting intruder activities in the cloud environment. Classification of all the system components helps in identifying efficient machine learning-based face recognition system for obtaining secure cloud data surveillance.

Overcoming security based risks of RFID tag using authentication techniques in the healthcare industry

Charanya Ramakrishnan; Vaishnavi Errabelli

Abstract

RFID technology has been used in various domains such as healthcare, military for numerous applications. Due to the open deployment of this technology, it is prone to major security flaws. Many solutions have been suggested recently to overcome these issues. However, some of the solutions do not address all the security flaws and many authors have proposed solutions with multiple assumptions. This has led to most of these solutions are being implemented in general. The healthcare domain is one of those industries where RFID is used and loss of security to information in this field can lead to numerous catastrophic issues. This research aims to provide a proposal on methods to overcome security-based risks of RFID tags using authentication techniques in the healthcare industry. The purpose of this research is to help future researchers shift their focus on the best direction of investigation in the related fields. A system component model has been proposed after conducting a review of the literature. A classification table has been drawn based on the collected articles against the system components table. An architecture diagram has been drawn to express the importance of the system components along with the evaluation of the articles collected from the literature. Inferences have been drawn and discussed to achieve the purpose of this research.

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Contact Angela on maag40@gmail.com

A DFC taxonomy of Speech emotion recognition based on convolutional neural network from speech signal

Surendra Malla, Abeer Alsadoon, Simi (Kamini) Bajaj

Abstract

Speech is an efficient agent to explicit attitude and emotions via language. The crucial task for the researchers is to find out the emotions through the speech utterance and eliminating the noise from a raw speech data. The goal of this research paper is to explore the latest journal papers in the field of convolutional neural network-based speech emotion recognition (SER) models related with the specific problem and provide a best solution which can recognize emotion in the speech from the speech signal.

The components of this proposed system are data, feature extraction and classification (DFC) that helps to assist in the implementation and evaluating the system. We propose the DFC taxonomy which will assist the end users in recognition of the emotion from the speech signal and making the artificial intelligence (AI) more robust by using convolutional neural network, facilitating a huge presence in the future system.

The system evaluates a state-of-the-art model that is associated to the convolutional neural network-based speech emotion recognition which presents and validates the DFC components. Based on system completeness, system acceptance, and by classifying 30 state-of-the-art journal research papers in the domain, components are evaluated, verified and validated.

The benefaction of this research paper is the critical analysis in the latest literature that are available on the convolutional neural network-based system which can recognize the emotion by extracting the features from the speech signal so that accurate recognition of emotion can be made. Also, highlighting the importance of DFC taxonomy.

Analysis of Algorithms in Automated Marking in Education: A Proposed Hybrid Algorithm

Binita Prasain, Simi (Kamini) Bajaj

Abstract

Automated grading of student's assignments and exam papers has been studied for more than a decade. This technique can be used to automatically grade student's assignments as well as exam papers without spending much time and effort. Many schools and universities are using this technology whereas, others are still struggling to find the best system which can accurately evaluate and provide the best result.

The main aim of this research is to find how automated marking system work and how this can be used to improve the teaching and learning process. This paper provides a brief overview of existing research being carried out in the field of natural language processing and machine learning algorithms to develop automated marking system and will present a sample framework which uses the data from the exam papers of students from different schools and universities and from some datasets and evaluates student answer based on the model answer provided to the system. The system finds similarity between the student answer and model answer and grade student answer based on the degree of similarity between them.

Through this paper, the reader will be able to get an overview of the recent development in the field of education with the use of an automated marking system to evaluate student's performance. This technology help teachers to save their time and effort whereas, students can get timely feedback which helps to improve their performance.

A Novel Hybrid Fall Detection Technique Using Body Part Tracking and Acceleration

Shatha Habeeb; Ahmed Ahsan Khan; Abeer Alsadoon; P.W.C. Prasad; Manoranjan Paul; Oday Jerew

Abstract

Falls by elderly individuals are a major issue in modern health care. A significant amount of research has been done in this domain. In this paper, we have proposed a hybrid solution for fall detection by using body part tracking and human body acceleration. The paper finds that in most cases vision-based fall detection systems work better and give a more accurate result when compared to non-vision-based systems because of the limitations of non-vision-based systems (e.g., people forget to wear the wearable detection devices). The proposed system improves the accuracy of the state-of-the-art solution and reduces its computation cost. The vertical distances between head and body center, and human body acceleration are the features used in the proposed method and a Support Vector Machine (SVM) classifier is used to classify the outcome into two classes. The depth image from a Kinect Camera was used as an input to avoid any privacy issues that may occur by using RGB-based texture images, and the events were classified as an activity of daily living (ADL) or a fall.

Reverse Engineering UML Sequence Diagrams for Program Comprehension Activities

Hayden Cheers; Yuqing Lin

Abstract

Program comprehension is a required activity for many software development and maintenance tasks. A common means of understanding software is though UML diagrams. UML diagrams model the design and implementation of an application, describing both its structure and behaviour. However, with rapid software development life cycles, UML diagrams often become inconsistent with the implementation of an application. This limits their effectiveness in program comprehension activities. This paper presents a program analysis framework to reverse engineer sequence diagrams from application source code. Part of this framework is the ability to filter out irrelevant operations from a sequence diagram in order to simplify the representation of an application. This is achieved by identifying important data, and following its use in the application. The purpose of this framework is to aid in program comprehension activities by providing up to date representations of an application; while also enabling developers to identify the logical operation of a program without interference from irrelevant or supporting operations.

Strategy-oriented Digital Transformation of Logistics Enterprises: The roles of artificial intelligence and blockchain

Hanwen Liu; Sardar Islam; Xiaobing Liu; Jia Wang

Abstract

Currently, affected by the COVID-19, the global economy has experienced varying degrees of impact, and the logistics industry, which is the foundation of social and economic operations, has also been affected to varying degrees. Under this economics background, the logistics industry is driven by factors such as resource integration to attract support from technology companies, new demand for contactless delivery, intelligent operating platforms such as blockchain, and artificial intelligence to replace labor shortages. The challenges for the development of logistics enterprises have become more prominent. This paper starts from a new strategic perspective: the strategyoriented digital transformation of the logistics enterprises analyzes from the three levels of the logistics value chain, refined operation development, and digital logistics activities. We present the applications of the most trending digital technology in logistics enterprises to help enterprises better understand how digital transformation through the effects of blockchain and artificial intelligence can enhance their competitiveness as a business strategy.

Chromosome Encoding Schemes in Genetic Algorithms for the Flexible Job Shop Scheduling: A State-of-art Review Useful for Artificial Intelligence Applications

Xuewen Huang; Sardar Islam; Yuxun Zhou

Abstract

This paper undertakes an innovative review and organization of the relevant issues of the FJSP in the genetic algorithm to provide some systematic way of organizing its issues and provide useful insights in this method of the genetic algorithm. Flexible Job-shop Scheduling Problem (FJSP) is a type of scheduling problem with a wide range of application backgrounds. In recent years, genetic algorithms have become one of the most popular algorithms for solving FJSP problems and have attracted widespread attention. In this paper, a comprehensive review of chromosome coding methods of the genetic algorithm for solving the FJSP and three standards are used to compare the advantages and disadvantages of each coding method. The results show that MSOS-I coding is a better chromosomal encoding method for solving FJSP problems, whose chromosome structure is simple, feasibility and larger storage. The main contribution of this paper is to fill the literature gap, because No such comprehensive review of the FJSP in the genetic algorithm prevails in the existing literature. This comprehensive review will be useful for scholars and practical applications of the FJSP and the genetic algorithm for artificial intelligence and machine learning implementations and applications.

RNN-CNN MODEL: A Bi-directional Long Short-Term Memory Deep Learning Network For Story Point Estimation

Bhaskar Marapelli; Anil Carie; Sardar Islam; Hayat Dino Bedru

Abstract

In recent years, an increased interest in the adaption of agile software development by companies. Using iterative methodology enables them to do issue-based estimation and respond quickly to changes in the requirements. Agile methodology adopts Story Point Approach to estimate the effort that involves a user story or a resolving issue. Unlike traditional estimation, Agile Methodology focuses on individual programming task estimation instead of whole project estimation. In this work, we approach story point estimation using the RNN-CNN model. We consider the contextual information in a user story in both forward and backward directions to build the RNN-CNN model. The proposed model adopts a Bi-directional Long Short-Term Memory (BiLSTM), a tree-structured Recurrent Neural Network (RNN) with Convolutional Neural Network (CNN), tries to predict a story point for a user story description. Here, BiLSTM forward and backward feature learning will make network preserve the sequence data and CNN makes feature extraction accurate The experimental results show the improvement in estimating the story points with a user story as an input using the proposed RNN-CNN. Furthermore, the analysis shows that the proposed RNN-CNN model outperforms the existing model and gives 74.2% R2 Score on the Bamboo data set.

Green Computing Sustainable Design and Technologies

Sarah Butt; Mohammad Ahmadi; Mahsa Razavi

Abstract

The Internet of Things (IoT) has generated increasingly dynamic impacts around the world due to its high-tech mechanisms in the scientific discipline. IoT is an intelligent infrastructure of numerous technologies which connects small to large-scale devices to the Internet for the purpose of communication. Alternatively, with the appreciation of such an advancement, there have also been numerous environmental issues raised from the operations of IoT. Green IT is a notion that has been envisioned to reduce, and possibly eliminate the environmental issues caused by IoT through its sustainable designs and approaches. This paper proposes four key research questions that will be addressed to evaluate the challenges in IoT and the solutions of Green IT. Additionally, a variety of literature reviews will be provided that will focus on the research questions proposed for this study. The questions will focus on the challenges in IoT, the characteristics of Green IT, the designs of Green IT, and the process of implementing Green designs as a solution to the environmental challenges. The significance of this literature review and the research questions will help to identify the most common practices and propositions on implementing Green IT. This paper attempts to gather past and modern research studies to evaluate and compare the best solutions for Green IT. It also intends to demonstrate a clear and comprehensive analysis of a combination of relevant proposals by different authors in determining the best sustainable IoT designs. Finally, a comparative analysis will be conducted to identify the best solution of implementing Green IT into the daily lifestyle.

Maximum Power Point Tracking with Modified Incremental Conductance Technique in Grid-Connected PV Array

Muhammad Abu Siddique; Muhammad Arif Khan; Adeel Asad; Ateeq Rehman; Rao Asif; Saif Ur Rehman

Abstract

In recent years, the demand for renewable energy sources has increased rapidly claiming their due share in the growing energy demands. Photovoltaic (PV) technology is currently considered to be an effective, efficient, and clean source of energy. Although, it has some challenges like inconsistency and uncertainty of climate profiles which can be tackled by selecting a better installation location and improving energy conversion efficiency. In this paper, an efficient and linear incremental conductance (IC) algorithm is deployed to track the maximum power point (MPP) of the grid-connected PV array. After the analysis of the various maximum power point tracking (MPPT) techniques, a co-design technique is proposed to obtain optimized design parameters for the PV system. Furthermore, the comprehensive design of the DC/AC inverter system is also merged in comparison with existing PV Systems.

Digital Energy Management amid the COVID-19 Pandemic in Mauritius Krisna Rama; Nuzhah Gooda Sahib-Kaudeer

Abstract

COVID-19 is a global pandemic declared by the World Health Organization in mid-March 2020. The virus epicenter was from Wuhan, a province in China but it quickly spread around the world. In order to combat the pandemic, strict sanitary measures were adopted worldwide, and full country lockdown was established in most countries including Mauritius. This strategy significantly impacted the economy as businesses closed and customary economic activities were halted with the exception of essential services. This caused a decline in the energy demand. In this paper, we explore the scope of digital energy management in the context of COVID-19 and make recommendations for the Mauritian context. The implementation of a smart grid and chatbots, the use of predictive analysis for consumer load demand and incentives for the use of IoT for smart homes are among the recommended measures discussed in this paper. We conclude how COVID-19, despite its challenges, can act as an opportunity for a digital revolution in Mauritius with regards to energy management.

Blockchain for data sharing in the rational use of coastlines and seaport demands in inter-organizational networks: Development of a new intelligent decision support system

Ana Halabi, Hugo Nino, Sardar Islam

Abstract— This paper presents a new concept of an intelligent decision support system (i-DMSS) which special relevance to the blockchain technology and guides into the data sharing construction defined for a specific strategic business process in which a seaport is concerned with the ability to share information with a seaport partner belonging to the same interorganisational system. Rules of the i-DMSS can be used as the seaport boundaries of the decision-making system, for the purpose of the rational use of coastlines and their demands. By developing a new concept for an i-DMSS, this paper makes a significant contribution to the literature in the areas of i-DMSS and blockchain.

Towards Adapting Autonomous Vehicle Technology for the Improvement of Personal Mobility Device

Maleen Jayasuriya, Janindu Arukgoda, Gamini Dissanayake; Ravindra Ranasingh

Abstract

Personal Mobility Devices (PMDs) incorporated with autonomy, have great potential in becoming an essential building block of smart transportation infrastructures of the future. However, autonomous vehicle technologies currently employ large and expensive sensors/computers and resource intensive algorithms, which are not suitable for low cost, small form factor PMDs. In this paper, a mobility scooter is retrofitted with a low cost sensing and computing package with the aim of achieving autonomous driving capability. As a first step, a novel, real time, low cost, resource efficient vision only localisation framework based on Convolutional Neural Network (CNN) oriented feature extraction and extended Kalman filter oriented state estimation is presented. Real world experiments in a suburban environment are presented to demonstrate the effectiveness of the proposed localisation framework.

An evaluation model for Cloud-based Data mining Systems with Hadoop Anil limbu, Sudath Heiyanthuduwage

Abstract

Program comprehension is a required activity for many software development and maintenance tasks. A common means of understanding software is though UML diagrams. UML diagrams model the design and implementation of an application, describing both its structure and behaviour. However with rapid software development life cycles, UML diagrams often become inconsistent with the implementation of an application. This limits their effectiveness in program comprehension activities. This paper presents a program analysis framework to reverse engineer sequence diagrams from application source code. Part of this framework is the ability to filter out irrelevant operations from a sequence diagram in order to simplify the representation of an application. This is achieved by identifying important data, and following its use in the application. The purpose of this framework is to aid in program comprehension activities by providing up to date representations of an application; while also enabling developers to identify the logical operation of a program without interference from irrelevant or supporting operations.

Detection of Chipless RFID Tag Using a Single Antenna RFID Reader System

Grishma Khadka, Meriam Bibile, Nemai Chandra Karmakar

Abstract

The detection of different types of chipless RFID tags using a single antenna reader is presented in this paper. The performance is evaluated through experiment and measured using Chipless RFID reader system with single antenna and compared with results from vector network analyser. It explains the operation of the reader and how the pic-microcontroller is programmed with the detection algorithm. Two types of tags have been tested, a printed tag which is flexible and will be in high demand for commercialization and a copper tag which has more durability. The post processing of the measured results to obtain the tag ID is performed using MATLAB. Adaptive Wavelet based detection algorithm is used for the decoding of the tag ID. After the tag ID has been decoded it is sent to a display screen on the DSP unit and/ or via RS-232 to the host computer application. There is no need of human interaction for the reader to interrogate the tag. At any time the user can choose to save the tag data received by the reader in a specified database/server.

Study of Security and Privacy Issues in Internet of Things.

Muhammad Khalid, Mohsin Murtaza, Mostafa Habbal

Abstract

With the advancement of technology and the internet, almost every device is connected to the internet. Internet of Things (IoT) can be explained as an extension of the internet in which smart devices are interconnected with each other. While each smart device has unique identifiers which makes every device unique. There are smart devices everywhere. These smart devices can also communicate with each other in a network and they work together thus eliminating the need for human interaction. IoT is relatively new and is still developing rapidly. So, there are numerous privacy concerns in IoT. IoT can be divided into different architectural layers depending on where the IoT is being used. The IoT model discussed in this research report is Service Oriented Architecture (SOA) which is divided into three layers, application, Network and perception layer. In 2020, during the COVID pandemic, the reliability on IoT has increased as people are working from home and many of the tasks have been automated using IoT. The number of security attacks on IoT has also been increased in 2020 alone, which has affected a large number of IoT devices. The objective of this research report is to discuss a number of security and privacy challenges in IoT based on the three SOA layers, the objective of this report also covers discussion on the above mentioned three layers, different technologies used in each layer for communication and different attacks and methods which target each specific layer also discussing different security attacks on IoT which occur ed in 2020 during the COVID pandemic phase.

This topic is chosen because the Internet of Things is becoming important and is impacting everything around us. It is expected that the total number of IoT devices will cross 20 Billion in 2020 and will have an impact of more than \$11 Trillion by 2025. Thus, the security of IoT is to be discussed.

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Smart farm and monitoring system for measuring the Environmental condition using wireless sensor network - IOT Technology in farming. Tharindu Bandara, Mansoor Raza

Abstract

Internet of things (IoT) gives a new proportion of smart farming and agriculture territory. Because with the development of the current world, the internet of things field has peaked with modern technology and modern techniques. In the modern world, IoT is used in every domain like smart city, smart university, smart car park system, etc. This paper is about the implementation of the smart farm. IoT concept helps in cost-efficient farming activities like crop and other resource management. With a wireless sensor network, it is easy to connect with every sensor node placed in the farming environment. Also, with the wireless sensor network, it

can connect with long-distance ranges. With the help of a sensor network, it can collect the data from the farming environment and analyze it according to the pre-defined values. The proposed system used IoT sensors to collect the data are soil moisture sensors, temperature sensors, water volume sensors, etc. According to the existing system analysis, the proposed solution contains a smart farm environment and a real-time monitoring system with the wireless sensor network for node connectivity. The proposed system provides a more reliable and flexible smart concept for the farmers. It is a simple architecture that contains the IoT sensors that collect the data from the farm field and transfer those data through

wireless sensor network to the central server and according to the input data, the primary server assigning the task to the particular devices.

Application of Machine learning algorithms in diagnosis and detection of psychological disorders

Angelika Maag, Ross Gunasekera

Abstract

A psychological disorder can be described as the disturbance of the natural state of the mind that affects the cognitive and social behaviour of the individual. The rapid modernization of society and the lack of social and personal interactions are further assisting in the increasing number of new cases of psychological disorders.

This paper intends to provide a brief overview of existing research in the field of machine learning and diagnosis, classification and prediction of psychological disorders and will present a sample framework which uses data from the electronic health records to extract different text-based documents to produce a tagged list of words relevant to these disorders which is matched against the symptoms and signs of different psychological conditions to predict the disorder. To validate this prediction, it is further checked against the output of machine learning models that predict psychological disorder based on the patient's MRI and PET images extracted from the patient's EHR.

Through this paper, readers will be able to gain an overview of recent developments in the field of diagnosis of mental disorders by utilizing machine learning algorithms and techniques to process the relevant unstructured data to improve accuracy of diagnosis and reduce the risk of misdiagnosis.

Mobile-Enabled Virtual Reality Visualisation Improves Learning and Training In Health Care

P.W.C. Prasad, Moshiur Bhuiyan, Angelika Maag

Abstract

Working in the health care sector required high skill sets and intensive training. Emerging technologies with realistic visualisation and practical such as virtual reality (VR) are being applied to the training process of the health care practitioners. Many researches have done studies in virtual reality and its implementation in education, more specifically in learning and training of a certain skill and enhancing user learning experiences. However, these studies usually remained in the development or research stage and have not widely implemented in real-life training due to various reasons. This research aims to review the effectiveness of virtual reality in the health care sector, its current solutions to the problem within different areas and analyse different VR research processes to encourage more practical implemented VR technology in learning and training skill for healthcare practitioners, rehabilitation and diagnoses as well as other aspects of virtual reality that can be considered within the health care sector.

Predictive analysis of the supply chain management using Machine learning approaches: Review and Taxonomy

P.W.C. Prasad, Vy Pham, Angelika Maag, Moshiur Bhuiyan

Abstract

Currently, there are many literature reviews on the application of predictive analytics in Supply Chain Management (SCM). However, most of them focus only on some specific functions in supply chain management, including Procurement, Demand Management, Logistics and Transportation, or purely technical aspects. The purpose of this paper is twofold: first, it aims to provide an overview of the outstanding supply chain management functions (SCMF) that apply predictive analytics; and second, to highlight practical approaches, algorithms, or models in SCM via a comparative review of machine learning approach for aspect-based predictive analysis. For these purposes, details of relevant literature were gathered and reviewed. Accordingly, this article will present the data, algorithms, and models applied in predictive analytics along with its performance, SCM result taxonomy, which includes all the necessary components in the effective implementing of SCMF. Via the result of the recent related publications and papers (2018 – 2020), Demand management and Procurement are the two main areas of SCM, in which predictive analytics is often applied. Particularly, accurate demand forecasting and sensing (Demand management) and sourcing risk management and supplier selection (Procurement) are among the foremost applications of BDA-enabled predictive models. This taxonomy not only helps scientists to have a steppingstone to provide more valuable articles in the future but also allows manufacturers to gain an in-depth understanding of these elaborate scenarios and better manage the supply chain management functions (SCMF) via the application of predictive analytics.

A Decentralised Land Sale and Ownership Tracking System using blockchain technology

Mahsa Mohaghegh, Aditya Panikkar

Abstract

The paper explores whether blockchain technology can be used to solve the problems in the land trade ecosystem. We first start by documenting the current problems in the land ecosystem. Then we look at the possible blockchain-based solutions that are being envisioned in various parts of the world. After this, the paper gives an architecture of the envisioned system and implementation which was done in phases with incremental development after each phase. The artefact was then subjected to an expert evaluation to determine the feasibility and efficiency of the artefact as per the real-world scenarios. It was found that blockchain technology can be used as an effective framework for storing ownership data and dealing with the land sale process. However, the solution still has some external operational requirements related to specific scenarios that deal with the initial entry of credible information on the blockchain database.

A Decentralised Registry for Firearm Tracking using Blockchain Technology

Mahsa Mohaghegh, RUDRA SAKHARDANDE

Abstract

The problem of illegal firearm trade and the resulting consequences have been the subject of much debate with respect to their causes and the solutions that need to be implemented in order to curb their devastating effects. The lack of a robust infrastructure for tracking firearms in the USA has been one of the major reasons contributing to lack of accountability concerning firearm ownership in the nation. The paper proposes the design of a decentralised system based on blockchain technology that would not only aid in tracking firearm ownership but also provide an infrastructure for managing firearm licenses and trading firearms while maintaining user privacy. The artefact was designed in 5 phases with incremental developments performed at the end of each phase. The software artefact was then subjected to analysis followed by expert evaluation where each feature was assessed to gauge its feasibility with respect to real-world operational and regulatory constraints. The system was found to successfully provide a decentralised platform for recording gun ownership data as well as trading firearms. The system also illustrates that the entire firearm tracing process can be decentralised through the voting system designed. The system, however, was still found to require more operational planning with respect to situations involving human interactions and regulations in order that user privacy is not compromised.

Augmented Reality Navigation in Spine Surgery.

Rong Huang and Moshiur Bhuiyan

Abstract

Spine has several complicated joints and nerves that need to look after well during the surgery procedure. Spine surgery in some ways easily creates scoliosis, degenerative disc disease, spinal stability problem. All these procedures need highly skilled operators with a specific program. The previous traditional program has, unfortunately, plenty of variations in image registration over precision rate and technical issues. As the technical problem, human mistakes, and shortage of standard equipment happen widely, the aim of this research is to increase the surgeon's efficiency in navigation location assurance and to decrease the exposure of radiation for patients and operators. This study is a review based approach. A variety of methods are applied to evaluate the different works conducted across the similar circumstances. 30 state of the art publications are categorised to elaborate and further elaborate the utility of the Augmented Reality (AR) navigation system in spine surgery. The criterions recognised for verifying AR navigation in spine surgery are system recognition, system comparison and its robustness. This paper will provide an analysis of the navigation systems methodology to spine surgery by Augmented Reality in present studies and propose an improved navigation framework that emphasises the characteristics and effectiveness of AR in regard of accuracy, radiation exposure and reliability in surgery compared to the present surgical procedure.

Heart disease monitoring and predicting by using machine learning based on IoT technology

Angelika Maag, qingyun he

Abstract

The major disease caused by human death nowadays is heart disease, due it happens suddenly and without significant symptoms, leads patient to miss the best time for first aid. With the development of IoT technology combined with the healthcare industry. It is providing technical support for clinic staff to predict and monitor heart disease patients remotely. In this paper, the main goal is to review the most relevant and latest papers to find the advantages and disadvantages and gaps in this area. Furthermore, compare the different proposed method's performance and present the best framework for heart disease continuous prediction and monitoring. Many researchers have been already providing the use of different types of machine learning algorithms to predict and diagnose heart disease. However, most of the previous researchers use the data collected from the dataset. As well know, to process the data collected from IoT sensors is harder than data collected from the dataset, because it may contain more noise and missing values in IoT sensor collected data. Dealing with those issues is the main challenge in the whole prediction system. Therefore, in this paper, we expect to reduce the research gap to find the best way to continuously monitoring and predicting patient ECG signals collected from IoT sensor devices in the meantime achieved acceptable prediction accuracy.

Classification of Melanoma (Skin Cancer) using Convolutional Neural Network

Yifan Gao , Shoman Gurung

Abstract

The current state of art solution for detecting melanoma using Convolutional Neural network has not considered selection of only affected areas from the input images of skin lesion which has resulted in the unnecessary processing of non-affected skin parts and thus less accuracy. The aim of this research is to propose a new solution to solve the above issue by creating a bounding box around the affected areas and decrease the search space by regression technique which results in more accuracy for classification. The proposed system consists of three parts. i) data augmentation ii) boundary extraction and iii) DCNN feature extraction and selection. In the boundary extraction part, exclusive or (XOR) is used with regression technique which creates the bounding box around the affected areas of skin lesion. It helps to reduce search space, improve the accuracy in terms of classification and reduce the processing time to extract the features. The proposed system here is tested on PH2, ISBI 2016 and 2017 datasets which has increased approx. 1.2 % of accuracy compared to state-of-art solution. The proposed system has outperformed the current best solution. Whereas, the difference is quite low, so can be further improve by testing other type of CNN network and

Soft Real Time Data Driven IoT for Knee Rehabilitation

SMN Senanayake ; Putri Wulandari

Abstract

This article presents soft real time data driven Internet of Things (IoT) for knee rehabilitation using cyber physical sensory information system interfaced with cloud storage. Custom made wearable wireless motion capture suit interfaced to smart watch as the IoT are built for biofeedback visualization. Mullti-sensor integration and data fusion mechanisms are employed to obtain input vectors of knowledge base and the output vector is based on patient classification defined using multivariate statistics by the healthcare professionals. Case based reasoning is applied for the established reference standard in order to produce patient centric actual knee rehabilitation status and classification using semi supervised deep learning method. Wearable IoT is automatically updated the actual knee rehabilitation status and classification of a patient using relevant cyber physical sensory information retrieved from the cloud storage connected vis AWS cloud. Hence, a soft real time data drive IoT for knee rehabilitation system is successfully tested and validated using semi supervised deep learning cyber physical sensory information database subject to statistically quantified parameters by health professionals based on principle component analysis and patient centric parameters based on independent component analysis. The data driven loT built has been validated in rehabilitation clinics by relevant physiotherapists and patients with the average age of ± 36.8 .

Proposing 2-tier Architecture for Permission-ed and Permission-less Blockchain Consensus Algorithms Based on Voting System.

Muhammad Khalid , Mohsin Murtaza ,Ather Saeed Saeed; Mansoor Raza

Abstract

With the rapid use of internet technology, security and performance are always at risk. The data on the internet can be compromised and the performance can be bottlenecked. The solution to this problem is the blockchain technology. Reason for choosing this field is because blockchain is a new technology and now it is one of the most demanding fields in the IT sector. Blockchain is based on peer-to-peer topology containing connected nodes. Each node has a cryptographic hash of the previous node (no malicious or unauthorized node can enter the linked nodes), timestamp and relevant data. Blockchain provides resistance against the unwanted interference and modification of the data and each node has separate processing power thus enhancing the security and performance of the host network. Permission-ed and Permission-less blockchain have their own properties and limitations and they can be used in different scenarios. In permission-less blockchain the nodes can be public, anyone can add nodes

to increase the performance (Bitcoin), while permission-ed blockchain is used within the enterprise or between enterprises where the nodes are private and new nodes need authorization to be added in link nodes. The aim of this paper is to study the permission-ed and permissionless blockchain, their similarities and differences, some of the consensus algorithms they use. The outcome of the paper will be understanding of some of the consensus algorithms and proposing a two-tier architecture which will contain a votingbased algorithm for enhanced performance.

Abnormal Activity Detection in Healthcare

Jack William Moore ,Hongen Lu

Abstract

Detecting abnormal activity is crucial in healthcare, especially for elderly people. Real time and early detection will prevent severe injuries and save lives. Time series data analysis can help to timely identify any abnormal behaviour outlier from daily routines. In this paper, we studied abnormal activity detection in healthcare applying machine learning and time series forecasting models and technology. A novel approach is proposed to detect abnormality in real time in consideration of risk factors in healthcare of elderly people. The approach is tested on real data set of a sensor hits and the locations of the sensor as well as descriptions outlining the types of sensors and the placements of the sensors. Experiment results show the effectiveness of the approach.

A Review of Blockchain-based on IoT applications (challenges and future research directions)

Walid Hasan , Albahlool Abood; Mostafa Habbal

Abstract

Internet of Things is defined as the framework of interconnected computing systems, mechanical and digital appliances, objects, animals, or people that are equipped with specific identifiers as well as the ability to transfer data over networks. Such devices will not require human-to-human or human-tocomputer interaction. This technology has emerged with a Blockchain, which has been used in cryptocurrency, to enhance the performance of security and decrease costs. Although emerging Blockchain with IoT has improved the entire system design. It still faces a number of issues relevant to time latency, anonymity, power efficiency, and big data. Blockchain has been used in various applications such as Healthcare, smart homes, and smart cities. In this paper, we will briefly define the idea of Blockchain including the definition of Blockchain, its types, advantages, and disadvantages, and then present some challenges of Blockchain-based applications on the Internet of things where we focus on Healthcare, smart homes, and smart cities. Finally, some future work direction will be introduced.

Content Caching and Clock Synchronization Assisted Low-Latency Communication in 5G Networks

Senura Liyanage ,SMN Senanayake

Abstract

The 5G era currently dawned upon the world has broadened the scope significantly from the previous generations by creating a space for multitude of advanced technologies integration and seamless delivery of many wireless services from many different domains. Two of the key areas that already started to have a huge impact by capabilities of 5G are cloud computing and Internet of Things (IoT). A fully-fledged 5G environment will also leverage cloud resource access to cater the promising low-latency, high reliability and network efficiency. There are various challenges to fully utilize the 5G architecture to cater the unprecedented amount of applications with the effective integration of cloud. Numerous researches have conducted studies with focus on different aspects of cloud for exploring what solutions would suite the best. The low latency requirement of 5G has been a major challenge to fulfill and several researches have proposed a wide variety of state-of-theart solutions that could immensely contribute to overcoming this challenge. Content caching in cloud and clock synchronization are two of the hot topics among many researches and we believe solutions incorporated by these can revolutionize the way 5G environments are built that can easily meet the IoT demands. This paper will conduct a comprehensive review on 7 best research papers that have specifically focused on content caching and clock synchronization to meet the stringent low-latency requirement of 5G networks. This review presents set of state-of-the-art research solutions with content caching and clock synchronization approaches that are available to build a more coherent and resilient 5G architecture design to meet the lowlatency constraints very effectively for IoT devices and smart applications.

Post study of Blockchain in smart health environment

Mansukhdeep Kaur ,Mostafa Habbal; Mohsin Murtaza

Abstract

Blockchain technology is being popular day by day and also serving in many applications and areas such as Internet of Things, Cloud Computing, Big data, Healthcare and many more because of its security strengths and benefits. It has been proven that blockchain applications are being utilized in healthcare to deliver secure data and to manage the medical data safely. Moreover, blockchain is transforming the traditional medical practices in effective ways such as diagnosing the problems effectively and treating through secure information sharing. There is no doubt to say that in future, blockchain will be performing in personalized, valid and secure healthcare by combining the medical information of patient and providing in a secure and updated setup. In this research paper, securities of healthcare applications and traditional and recent security developments are discussed. Due to Covid-19, it has become challenging for health care officials and government to protect and record individual's sensitive data safely. Also, spread of misleading information has been also increased during the pandemic and inability of existing platform for information validation leads to public panic. Implementation of blockchain-based tracking systems is essential for accurate and valid information sharing among people and Government. This paper focus on information security issues raised by Covid-19 pandemic as well as implementation of blockchain-based platform in healthcare to record and protect covid-19 related information and contact tracing.

Human-System Interaction Interface Utilizing 3D Gesture Recognition Techniques based on Wearable Technology

SMN Senanayake ,Joko Triloka

Abstract

Working with robots has the risk of safety and security of human interaction that limits the robots fine motion within a factory floor. Thus, it requires the improving human system interaction interface in a robotic assembly line. Gesture recognition can be used as an assistive tool to reduce the interaction complexities associated during human intervention with robots and machines. The aim of this research is to recognize 3D gesture using wearable devices in order to improve human-robot/machine collaboration through better interaction interface. The derived systems consist of Data Classification, Recognition, and interaction. The novel system proposed improves human-machine interaction interface and reduces the system complexity through improving the interaction system leading to better working environment. The proposed method helps in accurately recognizing of the human gesture and gives better gesture recognition accuracy of 86% with lesser error rate of 1.08%. The recognition of gestures helps to improve the interaction between humans and robots and helps in performing different robotic tasks. The method proposed in this research proves better performance compared to the currently existing gesture recognition methods. The data for gesture recognition is taken using different wearable devices, pressure and motion sensors. Reducing the interaction complexity will help to provide better working environment and gives assurance to worker about their security and safety with better working environment

Convolution Neural Network for Brain Tumor Detection & Segmentation using Deep Learning Techniques

SMN Senanayake ,Joko Triloka

Abstract

The purpose of the research is to find out how deep learning and the convolutional neural network will contribute to diagnosing, early detection and segmentation of brain tumors such as glioma, benign, malignant, etc. The aim is to achieve a higher degree of segmentation quality to resolve issues related to lack of the classification accuracy and poor performance in the segmentation and detection of tumors. The presented solution is an Advanced Cascaded Anisotropic Convolutional Neural Network (CA-CNN) architecture with an optimized feature selection method. The DFP (Data collection, feature extraction & selection and prediction) taxonomy is presented that involves data acquiring, data pre-processing, feature extraction, selection and prediction methods for effective tumor segmentation and detection. The presented system will enhance the prediction accuracy and involves the genetic algorithm for effective selection of features which prevents data redundancy and reduce the delay in the detection of tumors. The state of art solution based on 3-class classification produces 61% accuracy. The utilization of genetic algorithm minimizes the redundancy within input voxels and facilitates in the optimal selection of features which improves the classification accuracy of the solution. The research conducted is to improve the brain tumor segmentation and detection process in terms of accuracy, specificity and sensitivity using multi-scale prediction and cross-validation.

IoT for Smart Learning/Education

Fatima Furqan ,Sabin Kaji Shrestha

Abstract

Internet of Things, has opened many new possibilities in the world of technology. The interconnection among sensors, wearables, mobile devices, etc. is used to collect data. The collected data is processed and analyzed on fog and cloud through various algorithms to obtain an efficient solution to diverse problems. IoT has a wide range of spectrum for its implementation, and several industries have already started deploying a smart and efficient ecosystem. The Education sector is among these industries. There are many implementations of IoT for Smart Learning such as the use of smart boards in the classrooms, mobile applications allowing impromptu access to learning resources anywhere. These advancements are only the tip of the iceberg. The network of smart things can be utilized to make the learning process even smarter and more efficient. Even though the classes are equipped with smart devices, it is hard for educators to attend each student individually and find out the areas where they are facing problems, as every individual has a

different learning pattern. Keeping track of the students and to assist them individually requires a lot of time and effort. The level of difficulty increases further when face-to-face learning is switched to online learning. The research focuses on enhancing the online learning and teaching experience through the implementation of IoT using available devices, sensors, and other technologies such as machine learning and artificial intelligence.

Using Machine Learning to Forecast Time Series in Spacecrafts

Angelika Maag, Ross Gunasekara

Abstract

In deep learning, local binary patterns (LBP) are inefficient for the textural feature-based classification of the fatty liver because they lose some of the relevant features. The purpose of this study is to enhance classification accuracy. We analyze accuracy and processing time. The proposed system con-sists of a convolutional neural network with curvelet local binary pattern for feature extraction which improves accuracy and can also now determine the size of the fatty liver. Accuracy is measured using probability scores and processing time is measured with total execution time, using sample image groups from CT/MRI images. Results shows that the proposed solution has improved the classification accuracy to 98% from 94% on average and reduced the processing time to 0.313 seconds compared to the existing 0.561 seconds. Moroever, the proposed system has added a volume feature, a, green border represents the volume of the fatty liver. Overall, the proposed system has improving accuracy and processing time required for fatty liver detection whilst leaving desirable features of the best current solution intact.

MRI-based Diagnosis of Brain Tumours Using a Deep Neural Network Framework

Milan Acharya; Abeer Alsadoon; Shahd aljanabi; P.W.C. Prasad; Abmed Dawoud; Manoranjan Paul; Ghossoon Alsadoon

Abstract

The median survival time of patients with high grade glioma, a form of brain tumourtumour, is 1-3 years. The current best practice adopts Convolutional Neural Network (CNN) for image classification and tumourtumour detection. This method provides a significant improvement in brain tumourtumour segmentation of Magnetic Resonance Imaging (MRI) images in comparison to other frameworks, but it is nonetheless slow and lacks precision. We sought to build upon the current best practice model by utilising a Deep Neural Network (DNN) model, which entailed modification of the segmentation and feature-extraction stages in order to improve the accuracy of those stages and the resulting segmentation. We contrasted the accuracy and efficiency of our model to the current best practice model using 10 brain tumourtumour patient MRI datasets. First, the segmentation accuracy of our proposed model (M = 90%) outperformed that of the current best practice (M = 78%). Second, the tumourtumour detection processing time of our proposed model (M = 34ms) also outperformed that of the current best practice (M = 73 ms). We, therefore, replicated previous studies by showing that automatic segmentation can aid in brain tumourtumour detection. Importantly, we extended previous studies by proposing a model that classifies a brain tumourtumour with greater accuracy and within lower processing times. Validation of the model with a larger dataset is recommended.

A Novel Solution of an Enhanced Error and Loss Function using Deep Learning for Hypertension Classification in Traditional Medicine Akbas Ali; srijan Karki; Omar Hisham; Tarik Rashid

Abstract

Deep Learning in traditional medicine has different ways to detect and classify hypertension. However, not many researches have combined those ways to classify hypertension more accurately. This research aims to combine two of the most popular ways i.e. Tongue image and symptoms to increase the accuracy of detecting hypertension. The proposed system consists of training the parameters using error function with a Rectified Linear Unit (ReLU) Function and combining the learned features of both tongue image and symptoms using vector outer product. The proposed solution was tested on different data samples and provides the classification accuracy of 94.25% against the current average accuracy of 90.75%. The proposed solution only focused on increasing the classification accuracy. However, the proposed solution has not increased the processing time while doing so, instead the average processing time has decreased from 0.3774 to 0.3482. The proposed solution has increased the classification accuracy and decreased the processing time for classifying the hypertension in traditional medicine. The enhanced error function and loss function with ReLU activation function solves the vanishing gradient problem to achieve the accuracy of 94.25%.

Convolutional Neural Network with Segmentation in Brain Tumour Diagnosis: An extensive review

Nada Alsallami; Milan Shahi; Omar Hisham

Abstract

Convolutional Neural Network have been researched for diagnosis of Brain tumour. However, few techniques have been used in the real world because of various factors. The aim of this work is to introduced The Brain MRI Data, Segmentation process and Segmented Image Display (BDSSD) taxonomy, which describes the major components that are required to implement Convolutional Neural Network for brain tumour diagnosis. This taxonomy helps to segment different MRI image data using pre-processing and feature extraction process. The proposed model has been evaluated on the basis of state-of-art models. Thirty state-of art solutions have been selected and the proposed BDSD taxonomy is validated, evaluated and verified based on system completeness, recognition and comparison. The BDSSD taxonomy has been presented so that all aspect is included and explained based on Convolutional Neural Network which helps in the accurate segmentation of brain tumour using different accuracy measures such as dice coefficient.

Digital Fiat Currency (DFC): A Taxonomy for Automatic Sleep Stage Classification

Sarmad Al Aloussi; Omar Hisham; Amandeep Kaur

Abstract

Deep learning is the latest phenomena, which is being used to get the results for automatic classification, segmentation, image processing in various medical fields. This technology basically helps in reducing processing time and to avoid manual classification and identification. In recent years, convolution neural network in deep learning has been used for getting automatic results from the raw data. [1, 2] This technology is quite popular in automatic sleep stage classification, these days. It is basically used for automatic sleep stage classification, as manual classification is very time consuming and complex. [3] In previous times, the classification of sleep stages, was done with the help of manual human vision inspection, which were very time consuming and complex. To fasten this process and to reduce complexity, deep learning neural network models are used for classification. These neural network models help to improve this process and give better results than manual scoring of sleep stages. [4, 5] In this proposed DFC taxonomy, these components are implemented to validate the sleep stage classification in deep convolution neural network. [6]. After validation, evaluation and verification of this Digital Fiat Currency (DFC) taxonomy, it can improve the results of classification to large extent, which involves the major components of deep learning to improve the accuracy. In addition, this proposed method, is simple and easy to adapt for other methods. Keywords: Deep Learning, Sleep Stage Classification, Pornographically, Convolution neural network models, Classifiers, Feature Extraction.

Survey on Real-Time Tracking and Treatment of Infectious Diseases Using Mixed Reality in Visualisation Technique with Autoimmune Therapy

Razwan Mohmed Salah; Dharun Teja Vujjini; A/prof (Dr) Abeer Alsadoon; P.W.C. Prasad

Abstract

Healthcare is a key part of the biological process structure in particular semantic recognition of diseases. Critical states of death rates are arranged by determining and activating human epidemics by using smartphone applications for determining and activating human epidemics. Then, it is diagnosed and treat people over autoimmune facility visualized by image processors. The components system is classified into three attributes: Data, Prediction technique, and View. Data are collected from several attributes and resources such as sensors, bit rates, smartphones. While, prediction techniques promote energy responses, decision trees, correlation in the algorithm mass centric, SVM classifiers, of enumeration. error backpropagation, and least square reliefs. Based on several articles, using prediction techniques can be benefited the treating autoimmune therapy by classifying groups and validating criteria. Mixed Reality visualizations based on Image Guided Surgery (IGS) systems increasingly study now. Nevertheless, has not been used in the Operating Room ever so much. It is may due to the result of several factors such as the systems are developed from a technical perspective and rarely evaluated in the field. This paper introduces the Data, Visualization processing, View (DVV) taxonomy which defines each of the major components required for implementing a Mixed Reality IGS system.

A Novel Augmented Reality Approach in Oral and Maxillofacial Surgery: Super-Imposition Based on Modified Rigid and Non-Rigid Iterative Closest Point

Razwan Mohmed Salah; Sam Manohar; A/prof (Dr) Abeer Alsadoon; P.W.C. Prasad; Angelika Maag; Yahini Prabha Murugesan

Abstract

Background: This paper aim to improve the accuracy of super-imposition and processing time during Oral and Maxillofacial surgery. Methodology: The proposed system consists of Enhanced Tracking Learning Detection (TLD) enhance by an occlusion removal algorithm to remove occlusion in the region of interest. In addition, we propose a Modified Rigid and Non-Rigid Iterative Closest Point (MRaNRICP) for pose refinement. Moreover, this proposed MRaNRICP having a new error metric Boolean function to dictate the Iterative Closest Point (ICP)'s stopping condition. Results: The proposed system using a new error metric being defined as a new MRaNRICP and it gave overlay error from 0.22 - 0.29mm and processing time of 10 - 13 frames per second. Similarly, current system achieved the overlay error from 0.23 - 0.35mm and processing time of 8 - 12 frames per second. Conclusion: This research should reduce the computation time of the TLD algorithm and improve the accuracy of it.

DFA Taxonomy for the classification of ECG data for effective health monitoring using ML technology

Indra Seher; Razwan Mohmed Salah; ALI ALWAN

Abstract

ECG data of patients are collected using sensors which are further classified for monitoring their health. There are certain pitfalls of the existing classification schemes used for health monitoring that are poor extraction of features, ineffective filtering of data, improper access control, and issues related to dimensionality reduction. In this study, Machine learning (ML) is used to perform an early diagnosis of diseases in order to achieve the aim of effective and timely health monitoring of patients. Data pre-processing, Feature extraction, and Activity classification (DFA) are the major components utilised for the implementation of Health monitoring system based on ECG data classification using ML technology. This system classifies recorded activities based on extracted ECG data using Hidden Markov Model (HMM) and Support Vector Machine (SVM) and is integrated with Internet of Medical Things (IoMT) in order to diagnose patient's disease at early stages. The DFA taxonomy is evaluated based on the effectiveness and performance of the solution. It contributes to the reduction of dimensionalities that facilitates effective feature extraction and improves the accessibility of the model for better health monitoring. The importance of DFA taxonomy is demonstrated by classifying 30 research papers in the domain of health monitoring system. The classification depicts that few components of the MLbased ECG Data Classification system are validated and even fewer are evaluated to depict the effectiveness of the taxonomy.

Enhancing Local Binary Patterns for higher accuracy in Fatty Liver classification using Deep Learning

A/prof (Dr) Abeer Alsadoon; P.W.C. Prasad; Tarik Rashid; Angelika Maag; Yahini Prabha Murugesan

Abstract

In deep learning, local binary patterns (LBP) are inefficient for the textural feature-based classification of the fatty liver because they lose some of the relevant features. The purpose of this study is to enhance classification accuracy. We analyze accuracy and processing time. The proposed system con-sists of a convolutional neural network with curvelet local binary pattern for feature extraction which improves accuracy and can also now determine the size of the fatty liver. Accuracy is measured using probability scores and processing time is measured with total execution time, using sample image groups from CT/MRI images. Results shows that the proposed solution has improved the classification accuracy to 98% from 94% on average and reduced the processing time to 0.313 seconds compared to the existing 0.561

seconds. Moroever, the proposed system has added a volume feature, a, green border represents the volume of the fatty liver. Overall, the proposed system has improving accuracy and processing time required for fatty liver detection whilst leaving desirable features of the best current solution intact.

Motion Classification Using CNN Based on Image Difference

Wafaa Ahmed; Abdul amir A. Karim

Abstract

The classification of human actions has become an important topic in recent researches. Typically, the function of recognition human action is converted to the function of classifying the image that represents the person's motion. In this paper to classify the human motion the Convolution Neural Network (CNN) has been used to extract features by convolutional layers and in fully connected layer Softmax classifier is used to classify the motion. This method evaluates the differences between two sequences frames and this frame differences is used for training and testing in CNN. The propose system has been applied on three databases KTH, Ixmas and Weizmann. The results of experiments achieved accuracy 98.75% with KTH, 92.24% with Ixmas and 100% with Weizmann database.

Automatic Camera Switching in Soccer Game using Decision Tree

Huda Najeeb; Rana Ghani Al-Tuma

Abstract

Cameras management is challenging due in to the need of professional director for controlling and switching between cameras to select the best scène among them. The aim of this paper is substituting the director of soccer game broadcasting through building automatic camera switching system that works as a TV director that discovers the best scene from a set of cameras and broadcasts it over the network in real-time, taking into account the cinematic instructions represented by using the 180-degree rule when filming and avoiding jumping between scenes. Three cameras broadcasting the soccer game in real-time. Every scene in each camera is been analyzed and evaluated by using five parameters are frame direction, previous frame direction, finding ball, number of players, and their position. Many algorithms were used for analyzing the frame such as optical flow for determining the direction of frame, Euclidean distance and Extended Kalman filter for finding the ball, and contour and moment for detecting the players and determining their position. The results of the research were the proposed work was able to create one video stream from three video sources.

Strokes Classification in Cricket Batting Videos

Ishara Bandara; Boris Bacic

Abstract

In this paper, we present a novel approach to classify strokes in cricket batting. To classify front foot and back foot strokes, we created a feature space consisting of spatio-temporal time series obtained from generated stick figure video overlays. Classification was performed using Long Short-Term memory (LSTM) and Bidirectional LSTM networks. Both LSTM models accurately classified (100%) of all the videos from the testing split for a dataset created using publicly available videos (63 strokes). The presented approach has the potential to contribute to sport analytics and advance augment coaching systems and cricket viewing experience (including automated body segments annotations). Future work will include application in other sport disciplines and advancing prototype implementations on various platforms.

Investigation of Mobile Machine Learning Models to Preserve the Effectiveness of User Privacy

Sabih Rehman; Samrah Arif; Danial Motahari; Arash Mohboubi

Abstract

Machine Learning (ML) has become one of the dominant technologies in the research world. It is being applied without exception in every field where automation and future predictions are required such as cybersecurity, computer vision, data science, search engines and various other disciplines. The application of ML in search engines creates a high risk of breaching user's privacy because this involves using data gathered from a user's browsing history, purchase transactions, searching videos and queries. The user's information gathered from the search engine queries stored in computers, mobiles, other handheld devices is privately uploaded to a centralised cloud location and is then utilised in designing various ML models. As most ML models use a trained model that requires large datasets, user data gathered this way plays an important role in the development of the ML models. This, however, creates a significant privacy issue for individuals who may not want to reveal their personal information for ML training yet, prevention of this is beyond their access and control. In this article, we focus on the use of ML in mobile devices and address privacy concerns that can be raised by practising ML in mobile devices. The primary area of study in this research is the comparison of ML on mobile devices with ML on the cloud and figuring out its feasibility of becoming an essential ML for preserving user's privacy. Sequentially, this study first explores the need for using the ML algorithm to address privacy issues. Next, a pre-chosen ML algorithm will be tested on mobile devices and cloud to get the comparison outcome that justifies the

adoption of privacy-preserving ML model on mobile devices to preserve the user's privacy.

Olitical Arabic Articles Classification Based on Machine Learning and Hybrid Vector

Dhafar Abd; Ahmed T. Sadiq; Ayad R. Abbas

Abstract

Recently, there was substantial growth in the opinion data and the number of weblogs in the world wide web (WWW). The capability for automatically determining an article's political orientation might be of high importance in various fields ranging from academia to security. Yet, sentiment classification related to the weblog posts (especially the political ones), has been more complex in comparison to sentiment classification related to the conventional text. In the presented study, supervised machine learning along with feature extraction methods Term Frequency (TF) and five grams (unigram, bigram, trigram, 4-gram, and 5-gram) were combined to generate a hybrid vector that applied for the process of classification. Besides, for investigation purposes, Support Vector Machine (SVM), Naïve Bayes (NB), KNearest Neighbor (KNN), and Decision Tree (DT) for the supervised machine learning were used. After conducting the tests, the results indicated that the NB with unigram provided results with accuracy (93.548%). Thus, the NB is extremely acceptable in the presented model.

Rule Based Approach to Extract Metadata from Scientific PDF Documents

Ahmer Hashmi; Muhammad Tanvir Afzal; Sabih Rehman

Abstract

The number of scientific PDF documents is increasing at a very rapid pace. The searching for these documents is becoming a time-consuming task, due to the large number of PDF documents. To make the search and storage more efficient, we need a mechanism to extract metadata from these documents and store this metadata according to their semantics. Extracting information from metadata and storing that information is very time-consuming task and requires lots of human effort if performed manually due to large numbers of documents and their varying formats. In this paper, we present a rule-based approach to extract metadata information from the research articles. This approach was developed and evaluated on a diverse data-set provided by ESWC (2016) having a number of different formats and features. Evaluation results show that our proposed approach performs 22% better than CERMINE and 9% better than GROBID.

An Unsupervised Machine Learning Technique for Recommendation Systems

Mahsa Razavi; P.W.C. Prasad; Rupesh Shrestha

Abstract

Due to the advancement of the Internet, various kinds of data are easily found online which helps users to find useful information which are of their interest. However, the exponential growth of data has caused it to be complex and huge, so it has become difficult to filter valuable information from it. Recommendation systems can help to overcome this issue and give recommendations to the users which matches the area of their interest. Most of the systems rely on a rating prediction algorithm where the items are taken as recommended for a user if the user's predicted rating is high on those items. This research aims to increase the accuracy and reduce the processing time for recommendation using the prediction algorithm based on the unsupervised machine learning method. The proposed solution consists of Autoencoder to enhance the accuracy of prediction and reduce the processing time. Partially observed interaction matrix is used as input for the neural network model which outputs a complete rating matrix. The proposed solution achieved an improvement by 1.83%, 0.85% and 3.72% in cold start case for MSE, RMSE and MAE evaluation metrics respectively. The proposed solution performs better and will be used in cold start cases for datasets where timestamp value (user creation time) is used.

Proactive Big Data Analysis for Traffic Accident Prediction

Alexey Finogeev; Anton Finogeev; Ilja Kolesnikoff; Mikhail D<mark>ee</mark>v

Abstract

The article discusses the implementation of a multi-agent system of proactive monitoring and the intellectual analysis of big sensor data obtained from photo-radar complexes of photo and video recording of traffic accidents. Proactive monitoring of incidents is carried out on the basis of big data mining and predictive modeling of possible risks of incidents and accidents. The purpose of monitoring is to determine, evaluate and forecast the dynamics of changes in factors affecting the probability of road accident risks depending on the current situation on controlled sections of roads. The information for road traffic risk forecasting includes meteorological conditions. characteristics of road traffic, temporal and spatial data, the state of the road surface, characteristics of road sections (lanes, curbs, markings, bumps, road signs, lighting, etc.). Big sensor data are downloaded from spatially distributed photo and video recording systems, as well as from open sources of information on the Internet. The monitoring system is implemented using a multi-agent approach, which involves the use of software agents directly on distributed photo-radar systems and mobile communication's units

Improving the quality of education system using Data Science Technologies: Survey

Pattinige Fernando

Abstract

Education is the most important and silent weapon in a country for both individual and country's economy. However lower level of adoption in the education system, poor decision making with less accuracy levels, adoption to new curriculums or subjects, teaching and learning styles are the main issues in education systems. These factors also have further long-term consequences for a country such as unemployment rates rises high, lack of suitable workforce for the demanding fields, individual dissatisfaction while being unemployed as well as in the community and socially. Unemployment rates are risen in Australia from past few years and this as a factor will be an ongoing issue if the government does not take any further actions to overcome these issues will definitely be direct hit to their economy in relation to work force in the present and future. Therefore, the right technology should be implemented in order to obtain extract insights, obtain accurate decisions and high-level adoption in education sector, as an example technology such as data warehousing, big data, data mining, business intelligence and data analytics are in the peak of other industries such as aviation, retail, banking and other financial institutions. The main objective of this project is to facilitate a guide or a review for having data science technologies implemented in education sector in order to accomplish better education, as well as emphasis potential advantages of data technologies if it has been implemented in and around education systems.

Comparison of 4G and 5G Cellular Network Architecture and proposing of 6G, a new era of AI Bibi Mariat Shah

DIDI Mariat Sila

Abstract

In this 21st Century, the deployment of wireless technology has created a spur amongst technologists about the future progression of wireless communication. It has not only transformed the way of communication but also paved a way for many multi-functional devices and technology. The essence of modern culture is the digital economy, which is also the base for a wireless system of connections. There was a time when wireless networks evolved, from 0G towards 4G along with their architectures and new features. The correlation is contrasting between 4G and 5G with their architectures, coverage, speed quality of service, bandwidth, and latency rates. But later the 5G system architecture that worked intensively while the petulant analysis and consultations are stimulated to bring an advanced evolvement

in the wireless community, hence 5G was slowly and gradually deployed all over the world. Meanwhile, the idea of 6G is being looked into and the researchers and engineers are working on its architecture and development, which will make it significantly different from the preceding generations some of which have made a mark and some that have not. This paper presents a complete understanding of variations between 4G and 5G wireless network architectures, the comparisons, and the evolvement through all these years. The analytical and factual results help in advancing an evolved 6G architecture and the change, enhancement, and transformation it will bring in the future of Wireless Cellular Networks.

Analyzing Vehicle-to-Everything Communication for Intelligent Transportation System: Journey from IEEE 802.11p to 5G and Finally Towards 6G

Geetha Munasinghe; Mohsin Murtaza

Abstract

The rapid development of the Intelligent Transportation System increases the potential of Vehicular communication in a smart transportation network. Although there are several technological attempts to support vehicular communication, they have limitations from various perspectives including mobility, security, resource allocation, and device-to-device communication. In order to address those limitations, this study evaluates the most appropriate communication technology to transmit data in the future Vehicle to Everything (V2X) communication system. First, we conduct a performance evaluation of the current main vehicular communication system requirements. Then, we analyze the applications of communication technologies such as wi-fi, LTE, 5G, and 6G to fulfill the requirements of future V2X communication. Later, we explore the advanced features of 6G in the context of the Intelligent Transportation System. Then, we suggest that 6G technology as the corresponding communication technology to future V2X communication systems based on the analysis. Finally, we propose an architecture for the 6G V2X network and discuss security challenges and suggested solutions for the architecture.

Towards Real-Time Drowsiness Detection for Elderly Care

Boris Bacic; Jason Zhang

Abstract

The primary focus of this paper is to produce a proof of concept for extracting drowsiness information from videos to help elderly living on their own. To quantify yawning, eyelid and head movement over time, we extracted 3000 images from captured videos for training and testing of deep learning models

integrated with OpenCV library. The achieved classification accuracy for eyelid and mouth open/close status were between 94.3%-97.2%. Visual inspection of head movement from videos with generated 3D coordinate overlays, indicated clear spatiotemporal patterns in collected data (yaw, roll and pitch). Extraction methodology of the drowsiness information as timeseries is applicable to other contexts including support for prior work in privacy-preserving augmented coaching, sport rehabilitation, and integration with big data platform in healthcare.

Enhanced Advanced Encryption Standard with Randomized S Box

Dharm Jat; Ishpal Singh Gill

Abstract

Networks and communications today are an inherent part of any military and defense force organization. Internet of things (IoT) is also making inroads into various defense networks and applications. Such networks and applications have sensitive data riding on them which is vital national security. Hence, the requirement of protecting and securing this data. The Advanced Encryption Standard (AES), is a Federal Information Processing Standard (FIPS) for symmetric cryptography since 2001, and is the most secure symmetric in the public domain. However, the AES being a public algorithm and also known to be vulnerable to various crypt analytical attacks, cannot be used in its original form for military networks and applications to the AES algorithm, and proposes an enhanced AES algorithm with a randomized S box, which provides better security than plain AES with negligible overheads and hence can be employed for military networks and IoT applications.

Text Analysis for Honeypot Misuse Inference

Dharm Jat; Toivo Kamati; Saurabh Chamotra

Abstract

Transformation of raw text is required for computational text analysis using Natural Language Processing methods. Computational text analysis leverage on human brain limitations to automatically index documents for retrieval and topic generation for topic distribution correlations in corpus of voluminous documents. Natural language non-parametric and parametric Topic modeling with Expectancy Maximization and Gibbs sampling render technique to build Machine Learning models for evaluation with loglikelihood, topic coherence and coefficient of determination of held-out document. This research extends the concept of Natural Language Processing to automate analysis of High interaction honeypot system call documents to deduce system resources misuse by malcode during real-time engagement with the user-space applications of the deployed honeypot.

Modelling Environmental Impact on Public Health using Machine Learning: Case Study on Asthma

Lakmini Wijesekara; Liwan Liyanage Hansen

Abstract

Environmental conditions such as weather and pollution have direct links with public health. It is estimated that the global burden of disease attributed to environmental factors is 24%. A plethora of research has been carried out to investigate the links between the environment and public health. Most of them are clinical or experimental studies. In addition to the investigations of causal effects, it is always useful to study associations of weather and pollution with diseases to manage and mitigate the burden of diseases as well as other environmental issues holistically. Environmental conditions could be used to provide an alarm of a future episode of a disease such as asthma so that risky individuals can take precautions to minimize the risk. This study involves a case study of asthma which applies several machine learning techniques to build a classification model predicting the risk of getting future episodes of asthma based on weather and pollution conditions. Support Vector Machine, Artificial Neural Network, Decision Tree and Random Forest models were considered for the classification. Random forest model produced the best performance compared to other models with an accuracy of 77%. Decision tree model exhibits the highest sensitivity of 70%. Even though ANN gives the lowest accuracy of 59%, its learning curve shows a good fit.

A Novel Solution for Anti-Money Laundering System

Thi Mai; P.W.C. Prasad; Thi Huong Quynh Nguyen; Nguyen Tran Quoc Vinh

Abstract

In the age of unpredictable fluctuations of technology, disorganized detection has been recently figured out in most of present-day anti-money laundering systems. These obstacles are attributed to certain reasons associated with applying handcrafted manipulation in the long list of principles and having the shortage of real datasets about banking purchasers or the customers' information. This article demonstrates such an innovative approach to evaluate the data in terms of suspicious behaviors, clients' relationships, the awareness for the customers retrieval from the financial sector in social media platforms. The applicable datasets consisting of above 20000 sample records on Kaggle is the main resource for our service. Each entry was compiled from content of collected documents and was attached to the descriptions measuring positivity or negativity in catching money laundering. They were used to qualify the model in AutoML supplied by Google Cloud Artificial Intelligence. After having been satisfied the sentiment standard with a performance accuracy approximately 0.85, we attempted to forecast the sentimental design for all searched outcomes connected with the clients to distinguish badly known companies. The output is a beneficial tool for the companies getting used to realizing unauthorized clients. In other words, instead of having no information about new clients in Know Your Customer of anti-money laundering inspections, it is more helpful to utilize this service without wasting too much time and money for a huge number of other sites out there.

Optimizing mutant generation for Lustre programs with multithreading

Le Phol

Abstract

Mutation testing is a white box testing technique, this technique can be automated at several steps of the mutation testing process. But the execution time is one of the limitations that researchers on mutation testing are interested in solving. In our project, we plan to develop a mutation testing framework for the Lustre language, which is popularly used for reactive systems. In our previous studies, we have proposed a set of mutation operators for Lustre programs, and an automatic mutation tool to generate first-order and higher-order mutants. However, the performance of the tool is a bit low when generating mutants for Lustre programs. In this paper, we focus on improving the mutant generation by implementing multi-threading technique. The experimentation shows that the approach saves execution time.

A Comparitive Analysis of Existing Methodologies of Legacy Application Migration to Cloud

Yudara Damunukatiye Gedara; Mansoor Raza

Abstract

In the past few years cloud computing has become the most interesting and rapid growing technology in the IT industry. Nevertheless, lots of companies are facing troubles when implementing cloud-based solutions. Out of those issues, migrating enterprises legacy applications efficiently to cloud has become extremely complicated due to limitations in existing old applications. They must carefully think possible technical boundaries when moving the cloud infrastructure as there are several constrained imposed by cloud providers which may cause compatibility issues. To overcome migration issues, numbers of methods have been proposed by researches in literature. In this project it is discussed about methods and frameworks introduced in the cloud industry and provided a detailed review of those approaches. The existing methods used for the analysis are CloudMIG, REMICS, ARTIST, Cloudstep and Horseshoe. Finally, these methods are evaluated based on five criteria. As a conclusion, ARTIST framework can be considered as a comprehensive approach as it satisfies all criteria taken for the evaluation.

6





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