

CONFERENCE ABSTRACT

**2019 International Conference on Artificial Intelligence,
Robotics and Control (AIRC 2019)**

**2019 2nd International Conference on Bio-Signal and Image
Processing (ICBSIP 2019)**

December 14-16, 2019

The British University in Egypt, Cairo, Egypt



Co-organized by



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Conference Venue

The British University in Egypt, Cairo, Egypt

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Phone: +202 26890000; Mail: info@bue.edu.eg



Google Map:

<https://www.google.com/maps/dir//30.1186755,31.6106162/@30.118676,31.610616,16z?hl=en-US>

Recommended Hotels

- **Renaissance Cairo Mirage City hotel**

Add: Ring Road, Mirage City, P.O. Box 250, Heliopolis, Cairo 11757 Egypt

To BUE - The British University in Egypt--26.5 km--25munites by Taxi

- **Tolip Family Park Hotel**

Add: KM 26 Cairo / Suez Road, North of Family Park, Al Rehab City, 2nd Entrance, New Cairo, 11841, Cairo, Egypt

To BUE - The British University in Egypt—18.2 km—19munites by Taxi

- **The Westin Cairo Golf Resort & Spa, Katameya Dunes**

Add: Road 90, New Cairo City, Katameya Dunes, New Cairo, 11835 Cairo, Egypt

To BUE - The British University in Egypt—27.2 km--32munites by Taxi

- **Sunny Studio in New Cairo**

Add: Villa 8, block 9021, district 9, First Settlement Villa 8, 3rd floor, New Cairo, 11865 Cairo, Egypt

To BUE - The British University in Egypt—27.7 km--29munites by Taxi

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Welcome Message

Dear Participants,

Welcome to 2019 Cairo Conferences which are co-organized by Biology and Bioinformatics Society (BBS) under Hong Kong Chemical, Biological & Environmental Engineering Society (CBEES) and the British University in Egypt, Cairo, Egypt. 2019 International Conference on Artificial Intelligence, Robotics and Control (AIRC 2019) is intended to provide an international forum for those who wish to present their latest research results, innovative ideas, and experiences in the fields of Artificial Intelligence, Robotics and Control. 2019 2nd International Conference on Bio-Signal and Image Processing (ICBSIP 2019) aims at keeping abreast of the current development and innovation in the advanced of research area on Bio-Signal and Image Processing for participants to share knowledge and expertise in related issues.

The delegates are from USA, Canada, Netherlands, Germany, China, Japan, South Korea, Malaysia, Jordan, Algeria and so on. The Technical Program Committee has assembled a program comprising of excellent Keynote Speeches and Invited Speech from renowned scientists from the world.

On behalf of the Organizing Committee, we wish to thank the keynote speakers, invited speaker and authors of selected papers for their outstanding contributions. We would also like to thank members of the organizing committee, anonymous reviewers and volunteers for their great efforts. Without their contribution, dedication and commitment, we would not have achieved so much.

We sincerely hope that you will find the AIRC 2019 & ICBSIP 2019 beneficial and fruitful for your professional development.

Conference Organizing Committees

Presentation Instruction

Instruction for Oral Presentation

Devices Provided by the Conference Organizer:

Laptop Computer (MS Windows Operating System with MS PowerPoint and Adobe Acrobat Reader); Digital Projectors and Screen; Laser Stick

Materials Provided by the Presenters:

PowerPoint or PDF Files (Files should be copied to the Conference laptop at the beginning of each Session.)

Duration of each Presentation (Tentatively):

Keynote Speech: about **40** Minutes of Presentation and **5** Minutes of Question and Answer

Invited Speech: about **15** Minutes of Presentation and **5** Minutes of Question and Answer

Oral Presentation: about **12** Minutes of Presentation and **3** Minutes of Question and Answer

Instruction for Poster Presentation

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-Made Posters: Submit the poster to the staff when signing in; Poster Size: A1 (841*594mm); Load Capacity: Holds up to 0.5 kg

Best Presentation Award

One Best Oral Presentation will be selected from each session, and the Certificate for Best Presentation will be awarded at the end of the session on Dec. 15, 2019.

Dress Code

Please wear formal clothes or national representative of clothing.

Disclaimer

Along with your registration, you will receive your name badge, which must be worn when attending all conference sessions and activities. Participants without a badge will not be allowed to enter the conference venue. Please do not lend your name badge to the persons who are not involved in the conference and do not bring the irrelevant persons into the conference venue.

The conference organizers cannot accept liability for personal injuries, or for loss or damage of property belonging to conference participants, either during, or as a result of the conference. Please check the validity of your own insurance.

Keynote Speaker Introduction

Keynote Speaker I



Prof. Aman Behal

University of Central Florida, USA

Aman Behal received the 5-year integrated M.Tech degree in EE from IIT Bombay, India, in 1996 and a Ph.D. in controls and robotics from Clemson University, Clemson, SC, in 2001. After a brief stint as a post-doctoral associate in Bioengineering at Clemson University, he joined the faculty of the ECE Department at Clarkson University, Potsdam, NY in 2003. In 2006, he joined the University of Central Florida, Orlando, FL where he is currently a Professor jointly with the ECE Department and the NanoScience Technology Center. His current research interests include assistive robotics and nonlinear controls. He serves as an Associate Editor on the Editorial Board of the IEEE Transactions on Control Systems Technology. He has previously served as an Associate Editor for the IEEE Transactions on Cybernetics. He is the lead for the Disability, Aging, and Technology cluster funded under the Faculty Cluster Initiative at the University of Central Florida.

Topic: “Assistive Robotics: Challenges and Opportunities”

Abstract—A large number of individuals with disabilities require assistance for moving around and interacting with their surroundings. Nearly two-thirds of mobility device users have limitations in one or more Instrumental Activities of Daily Living such as grocery shopping, telephone use, meal preparation, light housework, etc. Over the past few years, assistive robotic devices have emerged to augment the functional capacity of disabled individuals. There are several mobile collaborative personal and professional service robots available on the market. Advanced sensing/actuation, machine learning, parallel processing, and social networking are combining to offer exciting opportunities for collaborative human-robot interaction and mixed human-robot networks for efficient propagation and sharing of skills. However, there are challenges associated with robot situational awareness, accurate transfer of user intent in the presence of sensory, motor, and/or cognitive deficits in individuals with disabilities, as well as ethical and privacy issues arising from interaction of networked robots, software agents, and people. This talk will focus on how we can take advantage of the aforementioned opportunities while overcoming these challenges.

Keynote Speaker II



Dr. Hussein Salama

The Microsoft Advanced Technology Lab Cairo, Egypt

Hussein Salama joined Microsoft in February 2010 and soon after became the director of the Advanced Technology Lab in Cairo. He leads a team of talented software engineers and researchers who use state-of-the-art AI techniques to develop and ship intelligent text and speech-based cloud services. Prior to joining Microsoft, Hussein was the Founder and President of Citex Software, a startup that developed an open source mobile advertising platform. In parallel, he operated a mini incubator for entrepreneurs with ideas in their early stages. While at Citex Software, Hussein helped incubate Blue Kai, a startup that was later acquired by Oracle. Before Citex Software, Hussein was the Chief Operating Officer of SySDSoft (acquired by Intel), a startup that offered software design services for major wireless product vendors. Hussein started his career at Cisco Systems where he worked on the first generation of VoIP products and led the integration between VoIP and Layer 3 network protocols. He has also led major projects in core routing. Hussein has contributions to several standards bodies (IETF, ITU-T, and ETSI) related to VoIP and MPLS. In addition, Hussein co-authored several conference and journal papers and he has seven issued US patents. Hussein received his BSc with Honors in Electrical Engineering from Cairo University, Egypt, in 1990 and his PhD in Computer Engineering in 1996 from North Carolina State University. In 2002, Hussein earned an MBA from San Jose State University, California. In 1995, Hussein was a Visiting Researcher at the Institute for Open Communication Systems (GMD-FOKUS) in Berlin, Germany. In 2006 and 2007, Hussein was an Adjunct Lecturer at the Department of Computer Engineering, Cairo University, Egypt. In addition, Hussein occasionally consulted some of Egypt's major organizations on strategic technology matters.

Topic: "Microsoft's AI Technologies & Solutions"

Abstract—In this talk, I will introduce the problem spaces that Microsoft is attempting to address using AI. I will discuss how AI is infused in a wide set of Microsoft products as well as the AI tools that Microsoft avails to third party developers and data scientists. In the second part of the talk, I will introduce Microsoft's Advanced Technology Lab in Cairo and briefly overview some of the projects we are working on

Invited Speaker Introduction

Invited Speaker



Prof. Chiharu Ishii
Hosei University, Japan

Chiharu Ishii received his PhD in Mechanical Engineering from Sophia University, Japan in 1997. He worked at Ashikaga Institute of Technology between 1997 and 2002, at Kogakuin University between 2002 and 2009, and at Shibaura Institute of Technology between 2009 and 2010. He has been working at Hosei University since 2010, and currently working as a Professor with the Department of Mechanical Engineering, Faculty of Science and Engineering at Hosei University. Dr. Chiharu Ishii has received several awards such as The Best Paper Award in the area of Tactile and Haptic Interfaces at the 4th International Conference on Human System Interaction (HSI 2011); Best Paper Award at the 1st International Conference on Computer Science, Electronics and Instrumentation (ICCSE 2012); Best Presentation Award at the International Conference on Intelligent Mechatronics and Automation (ICIMA 2013); Excellent Oral Presentation Award, at the 4th International Conference on Soft Computing & Machine Intelligence (ISCMCI 2017), Best Presentation Award, at the 2nd International Conference on Control, Robotics and Informatics (ICCRI 2019). He is currently a member of IEEE, SICE, JSME, RSJ, IEEJ and JSCAS. His research interests are in medical robotics, assistive technology and robust control.

Topic: “Development of Power Assist Suits for Aging Society”

Abstract—Recently, aging of society is progressing rapidly all over the world. Therefore, needs of nursing care for elderly people are increasing. In practice, however, 80% of caregivers have low back pain due to the nursing care such as transfer work. To help caregivers, many kinds of power assist suits have been developed, so far. However, conventional power assist suits have the following problems. Those are heavy, expensive and hard to put on the suit. Therefore, by following advices from caregivers who are working in nursing home, we developed a vest type power assist suit for the purpose of practical use in nursing care. The newly developed assist suit was termed "Cool Vest", which has characteristic that is lightweight, low cost and easy to put on and take off. On the other hand, also in agriculture or the construction site, low back pain becomes a problem due to aging of

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the worker. Therefore, we developed an outdoor type power assist suit to ease the burden on the waist for work in a half sitting posture, which was termed "Aero Back". Aero Back is commercially available now. In addition, other assist suits developed in my Laboratory, such as leg part exoskeleton and arm part exoskeleton for rehabilitation, and assist suit for walking support, are also introduced.

Detailed Schedule of Conference

Day 1 December 14, 2019 (Saturday)	13:00-16:00	Venue: Conference Hall-Hall No 3 (1st Floor, Building G) Arrival Registration
Day 2 December 15, 2019 (Sunday)	Morning Conference Venue: LH3 (Garden Entrance, Basement Floor, Building G)	
	09:30-10:00	Welcome Session Conference Chair: Prof. Omar Karam, The British University in Egypt, Egypt Program Chair: Dr. Walid Hussein, The British University in Egypt
	10:00-10:45	Keynote Speech I Prof. Aman Behal University of Central Florida, USA Topic: "Assistive Robotics: Challenges and Opportunities"
	10:45-11:30	Keynote Speech II Dr. Hussein Salama Director of "The Microsoft Advanced Technology Lab Cairo", Egypt Topic: "Microsoft's AI Technologies & Solutions"
	11:30-11:50 Coffee Break	
	11:50-12:10	Official Opening Honorary Chair: Prof. Ahmed M. Hamad, The British University in Egypt, Egypt
	12:10-12:30	Invited Speech Prof. Chiharu Ishii Hosei University, Japan Topic: "Development of Power Assist Suits for Aging Society"
	12:30-12:40	Group Photo
	12:40-13:30 Lunch (Party Room, 2nd Floor - Building C)	
	Afternoon Conference Venue: Seminar Room (2) (1st Floor, Building C)	
	Session 1: 13:30-15:15 Topic: "Bioinformatics and Image Processing"	
	15:15-15:30 Coffee Break	

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	Session 2: 15:30-17:30 Topic: “Artificial Intelligence and Control System”	
	13:30-17:30	Poster Session
	17:30-18:30	Transportation towards Dinner
	18:30-20:00 Dinner on Nile Boat	
Day 3 December 16, 2019 (Monday)	10:00-11:00 Lab Visit	

Tips: Please arrive at the Conference Room 10 minutes before the session begins to upload PPT into the laptop; submit the poster to the staff when signing in.

For dinner, please gather at Auditorium Entrance (Building C) in the front of the BUE main entrance gate at **17:30**. There will be a bus from BUE to the dinner venue.

Session 1

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-15:15

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Bioinformatics and Image Processing”

Session Chair: Prof. Khaled Nagaty & Assoc. Prof. Mostafa Salama

E0004 Session 1 - Presentation 1 (13:30-13:45)

Classification of Noisy Epileptic EEG Signals using Fortified Long Short-term Memory Network

Jarno Vrolijk and **Maryam Alimardani**

Tilburg University, Netherlands

Abstract—Recent work suggests that machine and deep learning models are prone to EEG artifacts and have staggering performance drops when used to classify EEG signals rich of noise. This particularly affects real-time performance of EEG monitoring systems such as brain-computer interfaces, thus rendering their applications in uncontrolled environments useless. These limitations have motivated efforts to develop fortification layers that leverage manifold learning in the lower dimensions to possibly improve the performance and the robustness of any deep learning model by separating off-manifold data points from the dense probability mass. The present study aimed to show that the fortification layer can learn the latent structure of an EEG dataset and that this can help increase the robustness of the classifier when tested on the same dataset contaminated with varying noise. In order to evaluate the performance of the proposed model, different artifacts were synthesized with low bandpass filters to mimic biological and Gaussian white additive noise. Results showed that the EEG signals used in this study followed the manifold assumption, and that the fortification layers learnt the lower discriminative structure from the raw denoised EEG signals. However, this did not significantly increase the robustness of the model to the noise.

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-15:15

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Bioinformatics and Image Processing”

Session Chair: Prof. Khaled Nagaty & Assoc. Prof. Mostafa Salama

E0014 Session 1 - Presentation 2 (13:45-14:00)

Research on Image-based Automatic Modification Algorithm of Eyebrows

Shiru Zhang, **Benqi Mu**, Yanhua Zhang, Xiaohuan Zhang and Xue Bai

Xi'an University of Science and Technology, China

Abstract—To a certain extent, modern aesthetics force people to change the shape and color of eyebrows according to the current popular form, and achieve the aesthetic effect of the overall effect. How to match the appropriate eyebrows according to different face types has always been pursued and desired by people. However, hand animation eyebrows require certain skills. Not everyone can draw beautiful and clean eyebrows. In order to meet the requirements of automation and real-time in virtual makeup technology, this paper proposes an algorithm for automatically modifying eyebrows by using digital image processing technique. Firstly, the Haar classifier and the Dajin threshold method combined with the Haar-Like feature and the AdaBoost algorithm are used to realize the detection, segmentation and replacement of the eyebrows. At the same time, the color transformation can be performed to achieve further modification effects. Through the experimental results, it can be found that the proposed automatic modification algorithm not only realize the automatic modification of eyebrows and the transformation of different colors, but also the makeup effect is natural and beautiful.

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-15:15

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Bioinformatics and Image Processing”

Session Chair: Prof. Khaled Nagaty & Assoc. Prof. Mostafa Salama

E2001 Session 1 - Presentation 3 (14:00-14:15)

Enhancing Program Management with Predictive Analytics Algorithms (PAAs)

Bongs Lainjo

Cybermatic International, Canada

Abstract—Background: The increase in the amount of big data and the emergence of analytics technologies has created the opportunity for applying algorithm development techniques using machine learning languages to predict future events (Thakar, 2015). The use of predictive analysis algorithms provides a mechanism for the utilization of organizational databases, files in equipment, videos, images, and other types of data to predict future incidences or events. Objective: To conduct inclusive analyses of contemporary literature of existing relevant narratives with a focus on program management themes, including state-of-the art methodologies on current plausible predictive analytics models. Methodology: The methodology used is the review and applications of programming platforms available that can be applied in the analyses of data to predict future outcomes. Program Implications: Program management requires the utilization of the existing machine learning languages in understanding future events and enabling effective preparations among stakeholders to make strategic decisions that enable the achievement of their goals, objectives, and missions (Karkhanis & Dumbre, 2015). Findings: The use of predictive analytics algorithms has gained thematic significance in automotive industries, energy sector, financial organizations, industrial operations, medical services, governments, and academic institutions. Conclusion: Predictive analytics algorithms are important in promoting the management of future events such as workflow or operational activities in a manner that organizations and institutions can schedule their activities and tasks in order to optimize performance. It also ensures that organizations use existing big data to predict future performance and mitigate risks (Perry, 2013).

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-15:15

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Bioinformatics and Image Processing”

Session Chair: Prof. Khaled Nagaty & Assoc. Prof. Mostafa Salama

E0015 Session 1 - Presentation 4 (14:15-14:30)

Improved Malignant Diagnosis using Fuzzy C-means based on Histopathological of PET-CT Lung Images

Gamal G.N. Geweid, Mahmoud A. Abdallah and Ayman M. Hassan

University of North Dakota, USA

Abstract—Currently, evaluation of abnormal lesions on lung Computed Tomography (CT) images is an important step, especially in patients who have tumor in the early stages, leading to increased survival rates. In early cases of tumor diagnosis on lung, Positron Emission Tomography (PET-CT) and histology images (colored) are very complicated since the intensity values of healthy and abnormal tissues may be very close. The objective of this paper is to differentiate between healthy and abnormal tissues through an image processing clustering algorithm. Fuzzy c-means clustering algorithm is applied to the lung PET-CT and histology images. The algorithm uses the microscopic examination of malignant and benign tissues to improve clustering process based on minimization of the objective function. This paper introduces a new method for predicting the type of patients with unknown lung cancer from their PET-CT images in early stages. The proposed technique differentiates between normal and abnormal tissues based on histopathological information. This paper develops a membership function based on iterative optimization to find the similarity between any measured data and the center leading to improving the clustering process. This incorporates preprocessing stages of noise removal and image enhancement. The diagnosis stage includes color PET-CT and histology image segmentation to identify the region with abnormal tissue. This leads to improved early diagnosis of lung cancer. Finally, the proposed technique measures the percentage of affected area with cancerous tissue. The algorithm is applied to 40 sets of different real data in the form of lung PET-CT and histology images with normal, abnormal tissue and early tumor. The experimental results show that the proposed algorithm proved effective in detecting tumors on lung PET-CT especially in images having tumors that were undetected by traditional methods.

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-15:15

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Bioinformatics and Image Processing”

Session Chair: Prof. Khaled Nagaty & Assoc. Prof. Mostafa Salama

E0017 Session 1 - Presentation 5 (14:30-14:45)

A Multi-resolution Approach for Modeling and Characterization of Biological Tissues

Ahmed Elbanna, Ahmed Ghareeb and Darin Peetz

University of Illinois Urbana Champaign, USA

Abstract—Currently, evaluation of abnormal lesions on lung Computed Tomography (CT) images is an important step, especially in patients who have tumor in the early stages, leading to increased survival rates. In early cases of tumor diagnosis on lung, Positron Emission Tomography (PET-CT) and histology images (colored) are very complicated since the intensity values of healthy and abnormal tissues may be very close. The objective of this paper is to differentiate between healthy and abnormal tissues through an image processing clustering algorithm. Fuzzy c-means clustering algorithm is applied to the lung PET-CT and histology images. The algorithm uses the microscopic examination of malignant and benign tissues to improve clustering process based on minimization of the objective function. This paper introduces a new method for predicting the type of patients with unknown lung cancer from their PET-CT images in early stages. The proposed technique differentiates between normal and abnormal tissues based on histopathological information. This paper develops a membership function based on iterative optimization to find the similarity between any measured data and the center leading to improving the clustering process. This incorporates preprocessing stages of noise removal and image enhancement. The diagnosis stage includes color PET-CT and histology image segmentation to identify the region with abnormal tissue. This leads to improved early diagnosis of lung cancer. Finally, the proposed technique measures the percentage of affected area with cancerous tissue. The algorithm is applied to 40 sets of different real data in the form of lung PET-CT and histology images with normal, abnormal tissue and early tumor. The experimental results show that the proposed algorithm proved effective in detecting tumors on lung PET-CT especially in images having tumors that were undetected by traditional methods.

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-15:15

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Bioinformatics and Image Processing”

Session Chair: Prof. Khaled Nagaty & Assoc. Prof. Mostafa Salama

E2007 Session 1 - Presentation 6 (14:45-15:00)

Medical Data Classification using Binary Brain Storm Optimization Algorithm

Ogwo Ogwo, Hamza Turabieh, **Alaa Sheta** and Scott A. King

Southern Connecticut State University, USA

Abstract—With the growing access to technology in the medical domain, an increased volume of medical data is recorded. The size and complexity of these data make the process of analysis of meaningful discoveries of beneficial patterns more challenging. This problem has attracted numerous researchers around the world. Statistical methods have been employed to handle medical data for diagnosis purposes. Unfortunately, these methods were less capable of dealing with these massive and complex datasets. To solve this problem, we suggest a process to classify medical data which includes feature selection and classification using a number of supervised learning techniques. Binary Brain Storm Optimization (BBSO) is used for feature selection, which is a population search approach that simulates the process of electing the best idea (solution), among others. We simulated six different classifiers: Naive-Bayes, K-Nearest Neighbor, Support Vector Machine, Linear Discriminant Analysis, Decision Tree and Random Forest. Five datasets adopted from the UCI Machine Learning Repository, (Breast Cancer, Diabetes, Heart Disease, Chronic Kidney, and SPECT), are employed as a benchmark test data. The performance of BBSO is evaluated using accuracy on the datasets using the various classifiers. Experimental results show that the proposed approach improves the classification performance for better medical diagnosis.

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-15:15

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Bioinformatics and Image Processing”

Session Chair: Prof. Khaled Nagaty & Assoc. Prof. Mostafa Salama

E2024 Session 1 – Presentation 7 (15:00-15:15)

Early Detection of Hepatocellular Carcinoma in PET/CT Images using Improved K-means Techniques Based on Pixel Density

Gamal G.N. Geweid, Mahmoud A. Abdallah and **Ayman M. Hassan**

University of North Dakota, USA

Abstract—Hepatocellular carcinoma leads to more human deaths currently. Patient survival rates can be increased by early detection of the tumor which is the main problem. In many cases, the task of early detection in liver grayscale images is very complicated since the intensity values between healthy and abnormal tissues may be very similar. In this paper, a pre-processing step of pixel colors is introduced to determine the pathology that is being observed, then, followed by a robust detection technique for liver PET/CT images using a k-means clustering algorithm based on pixel intensity optimization and evaluation of probability distribution functions. In this method, k cluster centers are changed with the distance between each pixel to each cluster center. This includes three main stages: pre-processing, segmentation, and measuring the percentage of the region having carcinoma. The unwanted regions can be removed from the segmented image by using the median filter. This work consisted of a comparative study of certain segments of medical image techniques in order to determine as accurately as possible when estimating quality segmentation from performance measures, such as Peak Signal-to-Noise Ratio, percentage of tumor detection, segmentation error, and coefficient similarity dice. The algorithm is applied to 60 sets of different real data in the form of liver PET/CT images with and without tumor tissues. The simulation results showed better detection was obtained using the proposed method.



15:15-15:30

Coffee Break

Session 2

Tips: The schedule for each presentation is for reference only. In order not to miss your presentation, we strongly suggest that you attend the whole session.

Afternoon, December 15, 2019 (Sunday)

Time: 15:30-17:30

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2002 Session 2 – Presentation 1 (15:30-15:45)

Estimation of Obstacle Contact Force and Position for Robots in Task Space

Haruhisa Kawasaki, Tetuya Mouri, Satoshi Ueki, Toshitake Yanagawa and Haruo Nagayama

Gifu University, Japan

Abstract—This paper presents a disturbance observer for robots that can estimate obstacle contact force and position in relation to the environment. The disturbance observer operates in task space, eliminating the need to measure accelerations. The global exponential convergence of the estimated disturbances to the true values was proven based on Lyapunov’s theory. An experiment using a tree-pruning robot which has the possibility of colliding with tree branches is presented to show the effectiveness of the proposed disturbance observer.

Afternoon, December 15, 2019 (Sunday)

Time: 15:30-17:30

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2004 Session 2 – Presentation 2 (15:45-16:00)

A Bearing Fault Diagnosis Method using Transfer Learning and Dempster-shafer Evidence Theory

Duy Tang Hoang and Hee Jun Kang

University of Ulsan, South Korea

Abstract—Rolling element bearings are among the most important components in rotary machines. The reliable operation of rotary machines highly depends on the performance of bearing. Therefore, bearing fault diagnosis is a critical task in the industry. Signal-based fault diagnosis for bearings has applied extensively deep learning algorithms because of their ability to automatically extract features from fault signals measured from rotary machines. However, designing a deep learning model for any fault diagnosis problem is not a trivial task since each deep model has a complex structure and a huge number of hyper-parameters and trainable parameters. Each hyper-parameter of a deep learning model has a profound impact on the performance of that model. The selection of appropriate hyper-parameters is often conducted manually based on the Trial & Error method and experiences of the designer. Transfer learning is a technique that adopts already existing machine learning models into new domains. This technique helps to save the designing and training time of machine learning models, especially deep neural networks. In this paper, transfer learning technique is exploited to the problem of bearing fault diagnosis. A pre-trained deep neural network in the domain of image classification is adopted and modified to extract features from vibration signals measured by multiple sensors. The effectiveness of the proposed method is verified by experiments conducted with actual bearing data set supplied by Case Western Reserve University Bearing Data Center.

Afternoon, December 15, 2019 (Sunday)

Time: 15:30-17:30

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2005 Session 2 – Presentation 3 (16:00-16:15)

Analyzing Cyber-physical Systems from the Perspective of Artificial Intelligence

Eric MSP Veith, Lars Fischer, Martin Tröschel and Astrid Nieße

Power Systems Intelligence, Germany

Abstract—Principles of modern cyber-physical system (CPS) analysis are based on analytical methods that depend on whether safety or liveness requirements are considered. Complexity is abstracted through different techniques, ranging from stochastic modelling to contracts. However, both distributed heuristics and Artificial Intelligence (AI)-based approaches as well as the user perspective or unpredictable effects, such as accidents or the weather, introduce enough uncertainty to warrant reinforcement-learning-based approaches. This paper compares traditional approaches in the domain of CPS modeling and analysis with the AI researcher perspective to exploring unknown complex systems.

Afternoon, December 15, 2019 (Sunday)

Time: 15:30-17:30

Venue: Seminar Room (2) (Building C, 1st Floor)

Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2006 Session 2 – Presentation 4 (16:15-16:30)

Efficient traffic Signal Control for Multi-phase Intersections

F. Bouriachi, B. Tolbi, K. Saidi and O. Kada Kloucha

University of Science and Technology Houari Boumediene, Algeria

Abstract—In this paper, we present an efficient traffic signal control strategy for multi-phase intersections. This strategy is used to determine the signal timing for fully actuated traffic control, keeping effective phases times on each cycle. The obtund values can be used to estimate the delay of vehicles. We show that the proposed strategy can be formulated as a nonlinear programming problem, solved by continuous genetic algorithm. We illustrate the proposed control strategy with several traffic scenarios based on real data collected from an existing complex multi-phase intersection in Algiers, Algeria. The experiment results show that the traffic signal plan obtained by the proposed control approach outperforms those currently used traffic signal control strategies under various demand scenarios.

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Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2008 Session 2 – Presentation 5 (16:30-16:45)

Multiple Waypoint Mobile Robot Path Planning using Neighborhood Search Genetic Algorithms

Dheeraj Reddy Maddi, **Alaa Sheta**, Ahmed Mahdy and Hamza Turabieh

Southern Connecticut State University, USA

Abstract—In this paper, we present a Neighborhood Search Genetic Algorithms (NSGAs) for mobile robot path planning. GAs have been used successfully in a variety of path planning problem because they can search the space of all possible paths and provide the optimal one. The convergence process of GAs might be lengthy compared to traditional search techniques that depend on local search methods. We propose a hybrid approach that allows GAs to combine both the advantages of GAs and local search algorithms. GAs will create a multiple waypoint path allowing a mobile robot to navigate through static obstacles and finding the optimal path in order to approach the target location without collision. The proposed NSGAs has been examined over four different path planning case studies with varying complexity. The performance of the enhanced GA has been compared with A-star algorithm (A*) standard GA, particle swarm optimization (PSO) algorithm. The obtained results show that the proposed approach is able to get good results compared to other algorithms.

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Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2012 Session 2 – Presentation 6 (16:45-17:00)

Measurement Model of Smart Factory Technology in Manufacturing Fields based on IIoT and CPS

Chui Young Yoon

Institute of On Kwang Technology Research, South Korea

Abstract—Smart factory in manufacturing industry has driven as a critical manufacturing industry policy in the 4th industrial revolution. Manufacturing industry has also built its smart technology environment appropriate for its manufacturing fields in order to improve its production activity and competitiveness. Its smart factory is very crucial for its innovative production and business activities, and for the efficient advancement of its performance. For managing and upgrading smart factory, an objective measurement framework has to be developed to reasonably gauge a smart factory technology of manufacturing fields. The trends of smart factory technology have generally been researched as major technologies such as IIoT and CPS. This research develops a measurement framework for the smart factory technology of manufacturing fields based on IIoT and CPS technologies. The measurement model for a smart factory technology consists of IIoT and CPS measurement domains. Each measurement domain has three or four measurement factors with twelve or sixteen measurement items. Hence, this study presents a measurement model that can gauge the smart factory technology of manufacturing fields with two measurement domains, seven measurement factors, and twenty-eight measurement items in a smart factory technology perspective.

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Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2017 Session 2 – Presentation 7 (17:00-17:15)

A Convolutional Neural Networks-based Model for Sales Prediction

Vitaliy Buyar and **Amal Abdel-Raouf**

Southern Connecticut State University, USA

Abstract—Big data is a term used to describe information assets which feature high volume, variety, velocity, and veracity, and which require specific technology and methods for conversion to value. A new generation of scalable-data technologies is needed to collect, store, manage and reveal the insights and meaning of big data. One of the ways companies can use their “big data” is applying prediction algorithms to their past sales numbers to make future sales predictions and then act accordingly to increase their business value. In this research, a convolutional neural networks-based model is presented. The model is used to predict future sales for a pharmaceutical company using their real large-scale sales data. The prediction results are evaluated based on the mean absolute error and mean absolute percent error metrics, which are used to determine the accuracy and show the effectiveness of our model.

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Topic: “Artificial Intelligence and Control System”

Session Chair: Prof. Aman Behal

E2025 Session 2 – Presentation 8 (17:15-17:30)

The Use of Word2vec Model in Sentiment Analysis: A Survey

Samar Al-Saqqa and Arafat Awajan

Princess Sumaya University for Technology, Jordan

Abstract—Sentiment analysis is an area that gains wide interest from research because of its importance and advantages in various fields. Different approaches and techniques are used to classify the sentiment of texts. Word embedding is one of the effective methods that represent aspects of word meaning and help to improve sentiment classification accuracy. Word2vec is well-known and widely used in learning word embedding that includes two models: skip-gram (SG) model and continuous bag-of-words model (CBOW). Some of the studies use one of these models and other studies use both of them. In this survey, we highlight the latest studies on using the Word2vec model for sentiment analysis and its role in improving sentiment classification accuracy.

Poster Session

Afternoon, December 15, 2019 (Sunday)

Time: 13:30-17:30

Venue: Seminar Room (2) (Building C, 1st Floor)

E2021

Data Protection Descriptor to Check IoT Devices for Compliance with the EU GDPR

Hwa Jong Kim and Seong Eun Hong

Kangwon National University, South Korea

Abstract—The area facing privacy concerns is the Smart Home, where a lot of information related to users is collected from IoT devices, but there is no way to know how the collected personal information is collected, processed, and managed. We define information metadata of an IoT device called DPD to enable personal information management. DPD (Data Protection Descriptor) is defined as metadata for checking whether a device collects user data while complying with GDPR in a smart home environment where IoT devices are used. By developing DPM (DPD Manager) that manages DPD, it shows the data generated and collected (user agreement, collection cycle, collection period, etc.) so that users can control the personal information collected by themselves, and the device connection and control functions implement in your application. DPD has defined a total of 15 attributes, and the 15 attributes include device provider, platform provider, gathering cycle, gathering time, URI, device address, interface, resource type, name, resource ID, value list, user consent, configuration info, device info, and platform info. DPD also referred to the core spec and resource type spec of the OCF standard for most of its attribute values to comply with the OCF standard.

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Venue: Seminar Room (2) (Building C, 1st Floor)

E2014

An Energy Optimal Guidance Law for Non-linear Systems Considering Impact Angle Constraints

Yue Zhu and Junyan Xu

Beijing Institute of Electronic System Engineering, China

Abstract—An energy optimal exo-atmospheric control guidance law against high speed target is proposed in this paper, and it can also satisfy the miss distance and impact angle constraints. As the main advantages, the proposed guidance law solves the problem of nonlinearity caused by the variability of missiles' velocity and the high speed of targets, which are non-negligible in reality but lack of theoretical research. In addition, it shows better performance in energy cost. Firstly, the kinematic model of missile-target and non-linear missile system equations are established. Then, the optimal guidance law is built, and it is solved by linearized methods. Finally, the performance of the guidance law is demonstrated by simulations.

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E2027

Machine Learning Algorithms for Diabetes Prediction: A Review Paper

Abir Al-Sideiri, Zaihisma Binti Che Cob and Sulfeeza Bte Mohd Drus

Universiti Tenaga National (UNITEN), Malaysia

Abstract—The early diagnosis of the diabetes disease is a very important for cure process, and that provides an ease process of treatment for both the patient and the doctor. At this point, statistical methods and data mining algorithms can provide significance chances for early diagnosis of diabetes mellitus (DM). In the literature, many studies have been published for solution of this problem. Initially, these studies are analyzed in detail and classified according to their methodologies. The main aim of this paper is to provide the comprehensive and detailed review of the diagnosis of diabetes by machine learning algorithms. Also, this paper presents a literature review on the diagnosis diabetes up to the mid of 2019. This paper provides to guide future research and knowledge accumulation and creation of classification and prediction techniques in diagnosis of diabetes. This study shows that the Support Vector Machine (SVM) algorithm is the most used machine learning algorithms and it provide more accurate and powerful results.

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Venue: Seminar Room (2) (Building C, 1st Floor)

E3001

The Synchronized Monitoring System for Operation Capability of Diver

Fan Wei, Li Meng, Li Qiang and Li Leilei

Sanda University, China

Abstract—Objective: Divers underwater operation capacity will gradually weakened as underwater operation time, until completely lost his ability to do homework, but the degree of weakened at different time after operation can't test. This study aimed at laboratory trained divers in the complete test ability of homework problems at work, a kind of design can be in real-time test platform diving underwater operation in testing the ability, to monitor the divers underwater operation ability during the test. Methods: The underwater operation ability test was divided into two aspects: physical test and reaction ability test.[1]. In this paper, we can carry out the physical test without decompression by using the method of the transition cabin of the pressurized cabin, and carry out the real-time test of the underwater reaction capability using the self-developed underwater operation capability real-time test device. Results: Using the laboratory pressurized chamber combined with real-time power bicycle do physical test, using the mature ability to respond to test software with waterproof, resistance to high pressure processing technology for underwater real-time response ability test, achieve real-time monitoring of underwater diving personnel when testing the effect of the operation ability[2].Conclusion: the test method can solve the problem that the operation ability cannot track and monitor in real time, which provides a convenient basis for the study of the ergonomic study of the divers.

