ICCSIT 2019

2019 12th International Conference on
Computer Science and Information Technology

Workshops

ICOAI 2019

2019 6th International Conference on
Artificial Intelligence

ICOSP 2019

2019 5th International Conference on
Signal Processing

University of Barcelona, Spain | December 18-20, 2019

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CONTENT

WELCOME

Dear distinguished delegates,

It is our great honor and pleasure to welcome you to 12th International Conference on Computer Science and Information Technology (ICCSIT 2019) with its workshops 6th International Conference on Artificial Intelligence (ICOAI 2019) and 5th International Conference on Signal Processing (ICOSP 2019) which will be held in University of Barcelona, Spain during December 18-20, 2019.

The program includes 67 selected papers which were submitted to the conference from universities, research institutes and industries. Participants come from more than 20 different countries and regions, including Brazil, Greece, Ireland, Kuwait, Lithuania, Malaysia, Morocco, Poland, South Korea, Sweden, Turkey, Thailand, USA, UK and etc. The evaluation of all the papers was performed based on the reports from anonymous reviewers, who are qualified in the field of Computer Science, Information Technology, Artificial Intelligence and Signal Processing. The presentations are divided into 6 breakout sessions and one poster session with topics including Intelligent Computing and Algorithms, Image Processing Technology and Application, Software Engineering and Data Computing, Computer and Information Engineering, Communication and Information System, Intelligent Information System and Automation.

A word of special welcome is given to our keynote speakers and invited speakers who are pleased to make contributions to our conference and share their new research ideas with us. They are Prof. Seppo J. Sirkemaa, University of Turku, Finland; Prof. Malleswara Talla, Concordia University, Canada; Prof. Naoshi Sakamoto, Tokyo Denki University, Japan and Dr. Keita Sugihara, Nanzan University, Japan.

We'd like to express our heartfelt appreciation to our chairs, sponsors, technical program committee members, authors and delegates, who made a lot of efforts and contributions year by year. Thanks to your support and help, we can hold this conference successfully and always keep making progress.

We believe that by this excellent conference, you can get more opportunity for further communication with researchers and practitioners with the common interest in this field. And your suggestions are warmly welcomed for the further development of the conferences in the future.

Capital of Catalonia and Spain's second city, Barcelona is utterly incomparable. It's one of a few must-see cities with its own identity. There's something to delight everyone in Barcelona. If you're a food lover then the city has a total of 20 Michelin stars, and if you want culture you've got an inexhaustible choice of beautiful buildings and events.

Wish you have a fruitful and memorable experience in Barcelona, Spain.

We look forward to meeting you again next year!

Yours sincerely,
Conference Chair
Prof. Mario Barajas Frutos
University of Barcelona, Spain

VENUE

Historical Building, University of Barcelona

Address: University of Barcelona Historical Building Gran Via de les Corts Catalanes, 585 08007 Barcelona SPAIN

TRANSPORTATION

The Aerobus - Barcelona Airport Express Bus To and From the City Centre

There are several different transfer buses going to and from Barcelona Airport. The Aerobus is the Barcelona Airport express shuttle bus that takes you to and from the airport and the city centre.

Aerobus route

T1 Aerobus A1 stops	T2 Aerobus A2 stops
⦿ Airport, T1 ⦿ Plaça España ⦿ Gran Via - Urgell ⦿ **Plaça Universitat (Near University of Barcelona)** ⦿ Plaça de Catalunya (City Centre).	⦿ Airport, T2 ⦿ Plaça España ⦿ Gran Via - Urgell ⦿ **Plaça Universitat (Near University of Barcelona)** ⦿ Plaça de Catalunya (City Centre)

Terminal T1 Schedule

(Airport) to Plaça de Catalunya (Barcelona)

Month	Day	Operating Hours	Frequency
January - December	Monday - Sunday	05:35 - 07:20	10 Minutes
January - December	Monday - Sunday	07:30 - 22:20	05 Minutes
January - December	Monday - Sunday	22:25 - 01:05	10 Minutes

Terminal T2 Schedule

(Airport) to Plaça de Catalunya (Barcelona)

Month	Day	Operating Hours	Frequency
January - December	Monday - Sunday	05:35 - 01:00	10 Minutes

For more transportation details please see www.aerobusbcn.com

RECOMMENDATION

You are suggested to make the room reservation by Booking or Agoda in advance. Some hotels near the venue (500m or less) are recommended as below:

Hotel Praktik Rambla (3 stars---4.4 / 5 points)
Rambla de Catalunya, 27, 08007 Barcelona
hotelpraktikrambla.com

_____
La Casa de Antonio Boutique Rooms Barcelona, (3 stars---4.2 / 5 points)
Gran Via de les Corts Catalanes, 584, 08011 Barcelona
lacasadeantonio.es

_____
Chic&basic Lemon Boutique Hotel (2 stars---4.4 / 5 points)
Carrer de Pelai, 6, 08001 Barcelona
chicandbasiclemonhotel.com

_____
Hotel Caledonian (3star---4.2 / 5 points)
Gran Via de les Corts Catalanes, 574, 08011 Barcelona
hotel-caledonian.com

_____
Ako® Premium Suite Hotel Barcelona (4 stars---4.3 / 5 points)
Carrer de la Diputació, 195, 08011 Barcelona
premiumsuitehotels.com

_____
H10 Casanova (4 stars---4.4 / 5 points)
Gran Via de les Corts Catalanes, 559, 08011 Barcelona
h10hotels.com

_____
Hotel Catalonia Gran Via BCN (4.3 / 5 points)
Gran Via de les Corts Catalanes, 550, 08011 Barcelona
cataloniahotels.com

_____
Hotel Soho (3 stars---4.3 / 5 points)
Gran Via de les Corts Catalanes, 543-545, 08011 Barcelona
hotelsohobarcelona.com

_____
Hotel Jazz (4 stars---4.5 / 5 points)
Carrer de Pelai, 3, 08001 Barcelona
hoteljazz.com

DETAILED AGENDA

[December 18, 2019-Wednesday]

10:00-17:00

📍 **Arcade, Mathematics Building, Ground Floor**

10:00—17:00	📋 Registration & Materials Collection

📝 Give your **Paper ID** to the staff.

(* Please show your **acceptance letter / passport** so that the staff could confirm your identity.)

↓

✏️ **Sign your name** in the attendance list and check the paper information.

↓

💼 Check your **conference kit**, which includes conference bag, name tag, lunch & dinner coupon, conference program, the receipt of the payment, the USB of paper collection and a pen.

↓

📝 Please copy your PPT to the computer on December 18 or in the morning of December 19 at the registration table.

💡 **Tips for Participants**

✧ Your punctual arrival and active involvement in each session will be highly appreciated.

✧ The listeners are welcome to register at any working time during the conference.

✧ Get your presentation PPT files prepared.

✧ Regular oral presentation: 15 minutes (including Q&A).

✧ Laptop (with MS-Office & Adobe Reader), projector & screen, laser pointer will be provided by the conference organizer.

✧ For personal and property safety, only the person wearing the name tag could enter the conference rooms.

✧ Please take care of your belongings all the time. The organizer shall not assume any responsibility for the loss of personal property of the participants.

DETAILED AGENDA

[December 19, 2019-Thursday]

Morning

📋 **Opening & Keynote Speeches & Invited Speeches**

◉ **Room Aula Magna, First Floor**

Chaired by

Dr. Branislav Vuksanovic, University of Portsmouth, UK

9:30-9:35	**Opening**	**Prof. Mario Barajas Frutos** University of Barcelona, Spain
9:35-10:15	**Keynote Speech I**	**Prof. Seppo J. Sirkemaa** University of Turku, Finland **Speech Title:** Key Information Systems Management Tasks - Flexibility and Robustness
10:15-10:55	**Keynote Speech II**	**Prof. Malleswara Talla** Concordia University, Canada **Speech Title:** Software Systems Architecture to be Value-Added in an Organization
10:55-11:30		📷 **Group Photo & Coffee Break** ☕
		Poster Session T1011, T2014, T5002, T6001
11:30-12:00	**Invited Speech I**	**Prof. Naoshi Sakamoto** Tokyo Denki University, Japan **Speech Title:** Learning Complexity of Neural Networks
12:00-12:30	**Invited Speech II**	**Dr. Keita Sugihara** Nanzan University, Japan **Speech Title:** Beyond Google's PageRank: Using Complex Numbers in Node Ranking Calculations

Lunch, Arcade, First Floor
<12:30-14:00>

DETAILED AGENDA

[December 19, 2019-Thursday]

Afternoon

Parallel Sessions

Room Aula Magna, 1st Floor	14:00-16:45	**Session I - Intelligent Computing and Algorithms** **11 Presentations** T1040, T1064, T1087, T1089, T1090, T1091, T2012, T2015, T3015, T1057-A, T3014
	16:45-17:00	☕ **Coffee Break**
	17:00-19:30	**Session II - Image Processing Technology and Application** **10 Presentations** T3017, T1029, T1075, T1037, T1030, T1083, T5001, T5003, T5006, T1082
Graduation Hall, Fac. of Philology, 1st Floor	14:00-16:45	**Session III -Software Engineering and Data Computing** **11 Presentations** T1047-A, T1018, T1053, T1034, T1035, T1026, T1036, T1056, T2003, T3007, T5007
	16:45-17:00	☕ **Coffee Break**
	17:00-19:30	**Session IV - Computer and Information Engineering** **10 Presentations** T2006, T1022-A, T1033, T2011, T5005, T1048, T1052, T1088, T1008, T1092
Room 0.1, Philology Building, Ground Floor	14:00-16:30	**Session V - Communication and Information System** **10 Presentations** T1058, T1067, T1027, T1085, T1084, T1086, T1096, T2004, T6005, T1049
	16:45-17:00	☕ **Coffee Break**
	17:00-19:45	**Session VI - Intelligent Information System and Automation** **11 Presentations** T1012, T3002,T1009-A, T1097, T1013, T3019-A, T1066, T1071, T3003, T3005, T4003-A

Dinner @ Hotel SERHS Rivoli
<19:50-21:30>
Note: Dinner coupon is needed for entering the restaurant

TOUR

[December 20, 2019-Friday]

📋 **Social Program**

🌟**Assembly Time**: 08:15 AM

Gathering at the gate of Aegee Barcelona **Address: Gran Via de les Corts Catalanes, 585, 08007 Barcelona**	
08:30 - 19:00	**The pending route: Banyoles Lake ⟶ Besalú ⟶ Pals**

The Banyoles Lake in Girona province is a beautiful lake famous for hosting some 1992 olympic water competitions.   It is also a popular training location for many foreign rowers, particularly English rowers.

Besalú, one of Catalonia's most stunning medieval sites from the XII-XIV century and vestiges of its Jewish past,   is a town in the comarca of Garrotxa, in Girona, Catalonia, Spain. The town's most significant feature is its 12th-century Romanesque bridge over the Fluvià river, which features a gateway at its midpoint.

Pals, one of the most charming villages on the Costa Brava, was built around a fortress and has kept its medieval look so well that a visit to Pals is like travelling back in time.

TOUR

Service includes:	Not includes:
- Guide	- Breakfast
- Car	- Lunch
	- Personal expenses

🔊 Notice!

1. Participants must register for one day tour **before December 05, 2019**.

2. The registration fee for social program is **120 USD**.

3. Please arrive at the designated assembly point **before 08:15 AM**.

CONFERENCE CHAIR

Prof. Mario Barajas Frutos
University of Barcelona, Spain

Mario Barajas Frutos is a Doctor in Education from the University of Barcelona and Master's Degree in Educational Technology from San Francisco State University in the USA. He holds degrees in Engineering and in Philosophy and previously taught Mathematics in secondary education. He teaches about Digital Learning Environments, and in the doctoral program 'Education and Society' at the Faculty of Education of the University of Barcelona. He is a founder of the new Institute of Educational Research of the same University. He is a member of different Research Committees, Journals and Conferences at an international level. During the last two decades, Dr. Barajas has coordinated and participated in a large number of the European Union funded projects and leads the research group Future Learning (www.futurelearning.org).

CONFERENCE CHAIR

Dr. Branislav Vuksanovic
University of Portsmouth, UK

Branislav Vuksanovic graduated from the University of Belgrade, Serbia with degree in Electrical and Power Engineering. He holds an MSc degree in Measurement and Instrumentation from South Bank University, London and a PhD in Adaptive Signal Processing from the University of Huddersfield, UK. Previously, he has worked as a Project and Design Engineer for Croatian Electricity Board in Osijek, Croatia.

During his academic career he has worked as a Research Fellow at Sheffield and Birmingham Universities on Optical Brain Imaging and Medical Video Compression projects. He has also worked as a Lecturer at the University of Derby where he was a member of Sensors and Controls Research Group. Currently he works as a Senior Lecturer at the University of Portsmouth, School of Engineering.

Branislav has published numerous papers in the field of active noise control, biomedical signal processing and pattern recognition for intrusion detection and knowledge-based authentication. He has also published a book in Digital Electronics and Microcontrollers field. He has won grants and has been visiting research fellow at the University of New South Wales in Australia and University of Alcala de Henares in Spain. Dr Branislav Vuksanovic is a member of IET, ILT and IACSIT. His current research interests are in the application of pattern recognition techniques for power systems and analysis of ground penetrating radar as well as biomedical ECG data.

KEYNOTE SPEAKER

Prof. Seppo J. Sirkemaa
University of Turku, Finland

Dr Seppo Sirkemaa works at Turku School of Economics at the University of Turku. His office is at University Consortium of Pori. Dr Sirkemaa holds a Ph.D. and a master degree in information systems science from the Turku School of Economics and Business Administration. Dr Sirkemaa has worked at various academic positions, as professor of information systems management and as a research professor at Turku School of Economics and Business Administration. Dr Sirkemaa has been the vice director of Turku School of Economics and Business Administration, Pori Unit during 2003–2008. He has acted as professor in Entrepreneurship at University of Turku.

Dr Sirkemaa has participated in several national and international research projects. He has also been active with conferences, for example as Conference Chair of the International Conference on Computer Science and Information Technology (ICCSIT) from 2015 (to present). He is active reviewer for several scientific academic journals and committee member of international conferences. Dr Sirkemaa has published over 100 academic publications.

Speech Title--- Key Information Systems Management Tasks - Flexibility and Robustness

Speech Abstract---Information systems have a key role in organizations. They should provide a robust platform for business activities and processes. In this presentation, a framework that identifies key areas in information systems management and development is suggested. Firstly, there are three main perspectives to information systems management. Secondly, it is vital to map key domains and activities in organizations information systems, so that systems would be operational even in unexpected situations. Expertise and skills in information systems management are also needed in working together within different stakeholders, to provide a robust, reliable and also flexible information systems and infrastructures in the organization.

KEYNOTE SPEAKER

Prof. Malleswara Talla
Concordia University, Canada

Malleswara Talla received M.Tech. degree from I.I.T., Kharagpur, India in 1981, and Ph.D. degree specializing Computer Communications & Networks from Concordia University, Montreal in 1996. He worked for Tata Consultancy Services (TCS), Bombay, and Societe Internationale de Telecommunications Aeronautique (S.I.T.A), Equant Canada Inc., and Orange Business Services for several years. Dr. Talla managed several projects in data communications, computer networks, and business performance excellence during his professional career. Dr. Talla is currently working for the department of Supply Chain & Business Technology Management at John Molson School of Business (JMSB), Concordia University, Montreal. Dr. Talla is a member of Canadian Operations Research Society (CORS), Professional Engineers of Ontario (PEO), Institute of Electrical and Electronics Engineers (IEEE), Project Management Institute (PMI), Association for Operations Management (APICS), and The Institute for Internal Controls (THEIIC). His teaching and research interests are mainly in Operations Management, Supply Chain Management, Information systems, Process Re-engineering, Business Intelligence, Data Communications, Computer Networks, S/w Architecture, Design, and Development. Dr. Talla is a registered professional engineer in Canada.

Speech Title--- Software Systems Architecture to be Value-Added in an Organization

Speech Abstract--- To compete in the marketplace, an organization should implement an appropriate competitive strategy along with an efficient, and responsive supply chain processes. The information systems that an organization adopts should map and fit well with the business processes. The software system architecture can tailor the configuration elements to the needs of organization processes. The software system architecture focuses on a set of high-level design decisions while accomplishing the system quality attributes in a software product. The software system architect prioritizes the architectural quality attributes and focuses on few of them for a unique system while achieving the requirements. The system performance is dependent on the local network, interconnection, and external systems. The processes of an organization evolve over time and the configuration elements can be tuned and revised to the evolution. Therefore, the software system architecture should also consider the ongoing evolution of the business processes and information systems. In this speech, I will present the fundamental building blocks of software architecture to propose configuration attributes to serve the system evolution to match with that of organizational processes to be value-added and risk-tolerant following the VAL-IT and RISK-IT frameworks

INVITED SPEAKER

Prof. Naoshi Sakamoto
Tokyo Denki University, Japan

Naoshi Sakamoto holds M.S. and Dr.S. degree from Tokyo Institute of Technology. Currently, he is a professor in Tokyo Denki University, Japan. Since 1992, he had been an assistant researcher in Hitotsubashi University and Tokyo Institute of Technology, successively. He had engaged in constructing and managing the campus area network. Originally, he was studying theoretical computer science. He won IEICE excellent paper award in 1999 for the study of the amount of information among initial conditions for distributed algorithms. Since 2001, he has been an associate professor at Tokyo Denki University. Then, since 2014, he has been a professor. Since 2016, he has also been an deputy director of Office of Educational Development for two years in the University.

Speech Title--- Learning Complexity of Neural Networks

Speech Abstract--- Recently, deep learning is developing greatly. Particularly, the field of image recognition and the field of machine translation have been making remarkable progress.

Moreover, there are various applications in many fields such as the field of information technology. Now, many researchers can not ignore them.

A current deep neural network requires a lot of input data, high spec computer, and long training time. Then, it acquires better recognizing ability than the human recognizing ability.

Now, when a neural network learns, how much does it require computational power and training time? The learning complexity of neural networks has been studying for a long time. The speaker is introducing the fundamental theories and recent results about learning of neural network

INVITED SPEAKER

Dr. Keita Sugihara
Nanzan University, Japan

Keita Sugihara graduated from Osaka University, Japan, with an engineering degree. He holds Master's degree and Ph. D. in arts and sciences from Nagoya University, Japan. Previously, he has worked as a Postdoctoral Research Fellow of Japan Society for the Promotion of Science (JSPS). Currently, he is working as an Assistant Professor in the Faculty of Science and Engineering at Nanzan University. His research interests include algorithms for ranking the nodes in a graph and social network analysis. He holds an internationally pending patent for an algorithm related internet search engines and this patent has been established in Japan. Dr. Sugihara is a member of Information Processing Society of Japan (IPSJ), Japanese Society for Engineering Education (JSEE), Institute of Electrical and Electronics Engineers (IEEE), Association for Computing Machinery (ACM) and International Network for Social Network Analysis (INSNA).

Speech Title--- Beyond Google's PageRank: Using Complex Numbers in Node Ranking Calculations

Speech Abstract--- The first part of this presentation introduces web information retrieval and Google's PageRank. This part of the talk focuses on how PageRank determines the score of a website on the Internet on the basis of its hyperlink relations. Furthermore, the characteristics of Google's widely used algorithm and the problems associated with PageRank are emphasized.

The second part of the talk covers basic graph theory to introduce the Hermitian centrality score, which is immune to the problems experienced by PageRank. The proposed algorithm uses complex numbers and the complex plane to calculate the score of a site. This algorithm can reproduce the ranking results of PageRank well, and the Hermitian centrality score can systematically change the score of a site.

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SESSION I

December 19, 2019
Session I

[Intelligent Computing and Algorithms]

🕐 **14:00-16:45**

Room Aula Magna, (1/F)

Chaired by Prof. Seppo J. Sirkemaa

University of Turku, Finland

11 Presentations—

T1040, T1064, T1087, T1089, T1090, T1091, T2012, T2015, T3015, T1057-A, T3014

*Note:

1. Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.

2. Certificate of Presentation will be awarded to each presenter by the session chair when the session is over.

3. One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded at the end of the session.

SESSION I

T1040 14:00-14:15	Fuzzy Classification Rules with FRvarPSO Using Various Methods for Obtaining Fuzzy Set Patricia Jimbo Santana, Laura Lanzarini, and Aurelio F, Bariviera **Presenter: Patricia Jimbo Santana** Central University of Ecuador, Ecuador Abstract-Having strategies capable of automatically generating classification rules is highly useful in any decision-making process. In this article, we propose a method that can operate on nominal and numeric attributes to obtain fuzzy classification rules by combining a competitive neural network with an optimization technique based on variable population particle swarms. The fitness function that controls swarm movement uses a voting criterion that weights, in a fuzzy manner, numeric attribute participation. The efficiency and efficacy of this method are strongly conditioned by how membership functions to each of the fuzzy sets are established. In previous works, this was done by partitioning the range of each numeric attribute at equal-length intervals, centering a triangular function with appropriate overlap in each of them. In this case, an improvement to the fuzzy set generation process is proposed using the Fuzzy C-Means methods. The results obtained were compared to those yielded by the previous version using 11 databases from the UCI repository and three databases from the Ecuadorian financial system – one from a credit and savings cooperative and two from banks that grant productive and non-productive credits as well as microcredits. The results obtained were satisfactory. At the end of the article, our conclusions are discussed and future research lines are suggested.
T1064 14:15-14:30	A Self-Training Ontology-Driven Approach for Topic Classification (ST-OLDA) Qi Hao, Jeroen Keppens, and Qdinaldo Rodrigues **Presenter: Qi Hao** King's College London, UK Abstract-Latent Dirichlet Allocation (LDA) is a topic classification technique that produces a probabilistic model based on word co-occurrence, for the purpose of text classification. Conventional LDA ignores the fact that words may have multiple meanings and that different words may have the same meaning. This focus on the words rather than their meanings limits the accuracy of the classification. This work introduces an intermediate labelling component to LDA using the concepts in DBpedia's ontology to help capture some of the possible meanings of the words appearing in the documents. We call this novel technique Ontology-Driven LDA (OLDA). As for LDA, OLDA can be combined with a self-training procedure to reduce the amount of manually classified data required (we refer to the self- training variant as ST-OLDA). We compared the classification performance of ST-OLDA against the performance of two other leading self-training classification methods: ST Term Frequency- Inverse Document Frequency (ST TF-IDF) and ST-LDA. Our experimental results show that the inclusion of the ontology component helps to reduce the training time by nearly half whilst achieving the highest accuracy in the classification of four widely used datasets. In particular, ST-OLDA outperforms ST-LDA's accuracy of classification by as much as 11%.

SESSION I

T1087 14:30-14:45	A Hybrid IDS Using GA-Based Feature Selection Method and the Random Forest ZhiQiang Liu, YuCheng Shi **Presenter: YuCheng Shi** Northwestern Polytechnical University, China Abstract-In recent years, the rapid development of internet technology brings many severe network security problems linked to malicious intrusions. Intrusion Detection System is considered to be one of the significant techniques to safeguard the network from both external and internal attacks. However, with the fast expansion of the IoT network, cyberattacks are also changing quickly, and many unknown types are showing up in the contemporary network environment. Consequently, the efficiency of traditional signature-based and anomaly-based Intrusion Detection System is insufficient. We propose a novel Intrusion Detection System, which uses an evolutionary technique based feature selection approach and a Random Forest-based classifier. The evolution-based feature selector uses an innovative Fitness Function to select the important features and reduces dimensions of the data, which raise the Ture Positive Rate and reduce the False Positive Rate at the same time. With exceptional high accuracy in multi-classification tasks and outstanding capabilities of handling noise in massive data scenarios, the Random Forest technique is widely used in anomaly detection. This research proposes a framework that can select more steady features and improve the classification results as compared with other technologies. The proposed framework is tested and experimented on UNSW-NB15 datasets and NSL-KDD datasets. Various statistical results and detailed comparison to other methods are presented within this article.
T1089 14:45-15:00	Findings Annihilator(s) via Fault Injection Attack (FIA) on Boolean Function of LILI-128 Wan Zariman Omar, Muhammad Rezal Kamel Ariffin, Solahuddin Shamsuddin, Suhairi Mohd. Jawi, Zahari Mahad **Presenter: Wan Zariman Omar@Othman** CyberSecurity Malaysia, Malaysia Abstract-LILI-128 keystream generator was designed by Dawson et al. (2000) and it was submitted to NESSIE project. This LILI-128 algorithm is a LFSR based synchronous stream cipher come with 128 bit key length. LILI-128 was designed to implement in hardware and software based and its offer large period and linear complexity. In this algorithm, the Boolean function given with coefficients, n is equal to ten (10) and its degree, d is equal to six (6). In conducting this attack, we aim to decrease the degree of the targeted Boolean equation by find it vulnerability with constructing low degree annihilator equation(s). We adopt the Fault Injection Analysis (FIA) methodology to achieve our objectives. In this study, we found the vulnerability via annihilator(s) through FIA (inject with value of one (1)) on Boolean function of LILI-128. With these injected Boolean functions, we proceed to utilize Hao's method to find new annihilator(s). Then we obtained new annihilator(s) on Boolean function of LILI-128 stream cipher. As a result, these newly identified annihilators successfully reduce the complexity of the published Boolean function to guess the initial secret key. It likewise gives truly necessary data on the security of these chose stream cipher concerning Fault Injection Analysis.

SESSION I

T1090 15:00-15:15	An Algorithm for Intelligent Identification of Moving Objects in Natural Environment Bhupendra Kumar Yadav and Jian Xiaogang **Presenter: Bhupendra Kumar Yadav** Tongji University, China Abstract-The intelligent moving object detection has become one of the key research areas in the computer vision. Although, there are a lot of researches and methods have been proposed related to the intelligent moving object detection, and visual surveillance and intelligent recognition system. However, still it's a great challenge of intelligent identification of moving object detection in the natural environment, due to the natural factors such as wind, sunlight, lighting and sudden illumination change which has been affecting the accuracy of moving object detection and intelligent recognition. For example, wind makes swaying trees and water rippling; sunlight makes shadows; lighting causes sudden change of light. To eliminate these problems, we have proposed a hybrid novel method based on Gaussian mixture model (GMM); Background subtraction; HSV color model; Feature extraction; and Neural networks. First, background is modeled with Gaussian Mixture Model (GMM), to eliminate the effect caused by the natural environment. Second, foreground image is extracted with background subtraction method. Third, the shadows of moving objects are detected and removed in HSV color model and morphological operation is done to get the clean foreground. That means detection is completed. Then, it is updated the background to adapt the dynamic background. After object detection, it is extracted shape features by using the Hu's seven moment invariants of the training samples of the image data, which is used to train the back propagation neural network (BPNN) as input. Finally, we have done the intelligent identification process on the trained BPNN to recognize and distinguish the detected object whether it is human or pets. The algorithm can not only eliminate the effect of natural conditions, like wind, sunlight and lightning, but also automatically update the background when the illumination changes suddenly, or moving objects stop to move, or the background objects turn to move. The advantages of the proposed algorithm are accurately moving object detection, and the detection result is not affected by the body pose. The experimental results have shown that the proposed algorithm has good robustness and real-time performance in natural environment.
T1091 15:15-15:30	Analysis of Patents In Cyber Security using Text Mining Hatice Işık Özata, Önder Demir, and Buket Doğan **Presenter: Önder Demir** Marmara University, Turkey Abstract- In the last decade, studies in the field of information security have progressed very rapidly. The advancement and development of new technologies in the field of information security not only affected existing areas, but also led to the emergence of new areas. Examining patent documents to monitor technological developments and track trends is an important way to make future predictions about technology. In this way, companies know which areas they should invest in and they can more easily predict in which direction research and development should proceed. To date, many studies have been conducted to analyze and share the patents obtained in different fields. Compared to the international literature, this study will include the following advantages compared to the current studies in the field of patent data and data

	mining; although the patent analysis method to be used in the study is a popular field in the world recently, it is planned to be a good resource for our country due to the limited number of Turkish publications and the lack of technology prediction in the field of information security increases the importance of the study. In this study, patent documents obtained in the field of information security will be analyzed. Data mining will be used to analyze patent documents received in the field of information security. Therefore, trends in the information security will be identified from the collected data.
T2012 15:30-15:45	A Credit Risk Predicting Hybrid Model based on Deep Learning Technology Chong Wu, Dekun Gao, and Siyuan Xu **Presenter: Dekun Gao** Harbin Institue of Technology, China Abstract-Credit risk evaluation (CRE) is a very challenging and important management science problem in the domain of financial analysis. Many popular methods have been applied to tackle this problem in recent years. However, feature extraction and imbalanced data problem have not been paid enough attention in the current research, which play significant function in field of CRE. In this paper, we employed a deep learning approach to extract effective features and under-sampling technique to balance dataset. Our model combine under-sampling technique, Deep Boltzmann Machine (DBM) and Discriminative Restricted Boltzmann Machine (DRBM) method. To examine the performance, real world credit data of Lending Club is applied in the proposed model. The stable and better performance results show that the Hybrid classifier we propose is more effective and powerful.
T2015 15:45-16:00	Application of Deep Learning in Art Therapy T. Kim, Y. Yoon, K. Lee, K. –Y. Kwahk, and N. Kim **Presenter: Taejin Kim** Kookmin University, Korea Abstract-Art therapy is a non-verbal psychotherapy that diagnoses and treats human psychology through the medium of arts. It is focusing on the characteristics that human psychology, especially unconsciousness, appears directly through non-verbal forms rather than specific language. It is used in various fields such as psychotherapy and rehabilitation, and is mainly used for psychotherapy of children who have difficulty expressing their feelings in a specific language. Art therapists interpret symbolic meanings shown in the drawings to diagnose the psychological state of the counselee, and record them as text. But, during this process, interpretation and diagnosis may be affected by the therapist's subjectivity and experience. Therefore, it is necessary to improve the reliability and objectivity of therapy by automating some of process. For this purpose, in this paper, we propose a CNN(Convolutional Neural Network)-based deep learning method for art therapy. Researches that classify images and generate captions using deep learning models have been actively studied in the field of computer vision and natural language processing. Especially, state of the art has been achieved by applying CNN-based image deep learning models and transfer learning using pre-trained model on large amounts of data. In this paper, we present a CNN model that finds symbolic features in drawings that can be used as a clue in the process of art therapy. Specifically, we apply the image captioning and attention techniques of deep learning to identify psychological

SESSION I

	features in each drawing. After key features in drawings have been identified and summarized through the proposed methodology, a psychotherapist can make consistent and standardized interpretation based on this in more efficient way. We expect that the proposed methodology may contribute to increase of reliability and objectivity of art therapy.
T3015 16:00-16:15	Application of Credit Card Fraud Detection Based on CS-SVM Chenglong Li, Ning Ding, Haoyun Dong, Yiming Zhai Presenter: **Chenglong Li** People's Public Security University of China, China Abstract-With the development of e-commerce, credit card fraud is also increasing. At the same time, the way of credit card fraud is also constantly innovating. Support Vector Machine, Logical Regression, Random Forest, Naive Bayes and other algorithms are often used in credit card fraud identification. However, the current fraud detection technology is not accurate, and may cause significant economic losses to cardholders and banks. This paper will introduce an optimization method to optimize the support vector machine by cuckoo search algorithm to improve its ability of identifying credit card fraud. Cuckoo search algorithm improves classification performance by optimizing the parameters of support vector machine kernel function (C, g). The results demonstrate that CS-SVM is superior to SVM in Accuracy, Precision, Recall, F1-score, AUC, and superior to Logistic. Regression, Random Forest, Decision Tree, Naive Bayes, whose accuracy is 98%.
T1057-A 16:15-16:30	Future Trends in Human-Computer Interaction by Virtual Reality in An Approach to Modular Production Plants Luis Omar Alpala, Juan Carlos Torres, Diego Hernán Peluffo, Cristina Muñoz, Janeth Alpala **Presenter: Luis Omar Alpala** Universidad Cooperativa de Colombia, Colombia Abstract-The industrial sector today faces strong global competition with custom production. With this, speed in processes requires agile innovations and rapid investments in new ways of producing. Future production assets should be as flexible as possible, so that they can be easily reused for new products. Through this research, an approach to the Smart factory is carried out through virtual technologies such as virtual reality (VR) and data analytics; promising technologies to improve competitiveness and flexibility in production processes. This work focuses especially on the computer simulation of small and medium-scale production plants in order to analyze all performance indicators of a production system. The modular production plant concepts are capable of adapting to quick and easy configurations in real time, therefore, within this concept the human-computer factor is analyzed under the Smart Factory approach and the use of disruptive technology (RV) It presents an emerging framework for the design, visualization, immersion and interaction of information to configure and propose projections of real scenario models based on factors such as user experience and data analytics. This solution can be replicated and adapted to the specific needs and problems of production systems in companies, offering the functionalities required in each case and adjusting to the criteria and pace of implementation they need. For this research, real production plants are taken as case studies.

SESSION I

T3014 16:30-16:45	Using Word Embeddings in Turkish Part of Speech Tagging Şevket Can, Bahar Karaoğlan, Tarık Kışla and Senem Kumova Metin **Presenter: Senem Kumova Metin** İzmir University of Economics, Turkey Abstract—The close relation between the stem (relatively the word meaning) and part of speech tag of the word turns part of speech tagging as an important preprocessing task in natural language processing and understanding problem. For example, if the Turkish word "gelecek" is labeled as noun, the word stem is to be "gelecek" meaning future. If it is labeled as verb, the stem is "gel" and it refers to "to come". In many languages including Turkish, part of speech tagging problem is to be solved by rule based approaches. In this paper, a setup where the neural network architecture SENNA together with word embeddings is employed. The combination of Wikipedia 2016 and METU corpora is utilized in training of word embeddings; PARDER is used in part of speech training and testing. The word embeddings that are obtained by different methods and different vector sizes are evaluated intrinsically considering analogic and semantic similarity distances; and assessed extrinsically based on the performance on part of speech tagging task.

Coffee Break

<16:45-17:00>

SESSION II

December 19, 2019
Session II

[Image Processing Technology

and Application]

🕐 **17:00-19:30**

Room Aula Magna(1/F)

Chaired by Prof. O. Kurasova

Mykolas Romeris University, Lithuania

10 Presentations—

T3017, T1029, T1075, T1037, T1030, T1083, T5001, T5003, T5006, T1082

*Note:

1. Please arrive 30 minutes ahead of the sessions to prepare and test your PowerPoint.

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3. One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded at the end of the session.

SESSION II

T3017 17:00-17:15	Black Sigatoka Classification using Convolutional Neural Network Cristian A. Escudero, Andrés F. Calvo and Arley Bejarano **Presenter: Cristian Andrés Escudero** Universidad Tecnológica de Pereira, Colombia Abstract-In this paper we present a methodology for the automatic recognition of black Sigatoka in commercial banana crops. This method uses a LeNet convolutional neural network to detect the progress of infection by the disease in different regions of a leaf image; using this information, we trained a decision tree in order to classify the level of infection severity. The methodology was validated with an annotated database, which was built in the process of this work and which can be compared with other state-of-the-art alternatives. The results show that the method is robust against atypical values and photometric variations.
T1029 Video 17:15-17:30	Visual Restoration of Ocean Wave effects Produced by Houdini in the Engine Jia ni. Zhou and Tae soo. Yun **Presenter: Jia ni. Zhou** Dongseo University, South Korea Abstract-In this paper, we propose to import the ocean wave effects produced by Houdini into the game engine through plug-in form and display it through real-time rendering and the optimal value setting of the plug-in in terms of animation completeness and detail reduction degree is verified by the way of example production. We use the ocean wave effects produced by Houdini in the Unreal Engine as the research theme. Film and games are two important players in the entertainment industry. The game focuses on the interaction with the player, while the focus of the film is the expression of the picture. This also makes the game and the film have very different performance characteristics in the early stage of development. It is worth noting that the boundaries between film and video have become increasingly blurred in recent years. At the cultural level, there are cases of integration of film and video in IP cooperation and narrative techniques, also want to improve efficiency. The significance of the optimal value is that this value can restore the visual effect of Houdini to the maximum effect. The introduction of the game engine provides a more convenient and real-time display, and also provides a wider application scenario for the wave effect produced by Houdini. The form of plug-in realizes the binding of the film special effects software Houdini and the game engine. It also confirms the general trend of mutual integration of games and movies from the technical point of view.
T1075 17:30-17:45	Facial Micro-Expression Analysis Via A High-Speed Structured Light Sensing System Yuping Ye, Zhan Song, and Juan Zhao **Presenter: Zhan Song** Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China Abstract-Facial micro-expressions play a pivotal role in human non-verbal emotional expression, so it can be used in many fields such as criminal interrogation, clinical diagnosis and animation. Conventional means are usually based on 2D image analysis means, which has shown its disadvantage in real applications. In this paper, a 3D-based facial micro-expression analysis method is firstly proposed. The 3D acquisition equipment based on high-speed

	structured light is established to capture dense and accurate 3D facial shapes with a maximum speed of 300Hz. Facial micro-expression detection method is put forward to extract the onset and offset of micro-expression sequence. Finally, a 4D descriptor is introduced to describe the timing characteristic of facial micro-expression. Experiments on real human faces are used to verify feasibility of the proposed system and method.
T1037 17:45-18:00	Grain Size Characterization of Ceramic Matrix Composites Gao Xiang, Tan Rong, Li Guanghui, and Yao Leijiang **Presenter: Gao Xiang** Northwestern Polytechnical University, China Abstract-In the field of materials science, the mesoscopic geometry of materials is of great significance for the research and development of materials and materials. This paper mainly focuses on the image data of existing ceramic matrix composites, and studies the characterization method of grain image of ceramic matrix, which realizes the accurate characterization of grain size. It has important practical research on the mesostructure of ceramic matrix composites. Value. Taking the SEM grain image of 5μm resolution of self-toughening silicon nitride (Si3N4) ceramic as an example, the grain image is segmented by median filtering, image binarization and watershed algorithm, and then used to directional bounding box (Oriented). The Bounding Boxes, OBB) algorithm finds the rectangular outline bounding box of the grain, enabling accurate measurement and statistics of the grain size.
T1030 Video 18:00-18:15	Color Composition in Media Facade of Narrative Subject based on Color Psychology Linwei. Fu, Jiani. Zhou, Tae soo. Yun **Presenter: Linwei Fu** Dongseo University, South Korea Abstract-In this paper, we propose to combine the scene color composition design of media façade with color psychology, to achieve the purpose of giving the media façade a more expressive form and richer artistic value, and enhance its narrative ability, give the media façade a higher artistic value. It can also solve the problem of visual fatigue caused by the excessive color of the media façade. With the development of digital technology, media facade technology, as the most popular high-tech nowadays, is more and more widely used in the field of media technology. Due to the influence of the external environment, the content is mainly displayed to the audience through various basic color pattern transformations. However, the case of the narrative media facade is often endowed with certain artistic value and thus is more acceptable to the public. So how to use a single color transformation to express the narrative way as delicate as a movie is a problem worth exploring. Aiming at this situation, this paper analyzes the influence of color psychology on the production of media façade to enhance its narrative. And through the comparison of two cases with the same attribute at different times, the common feature of color composition is expressed in the expression time conversion and seasonal change.
T1083 18:15-18:30	In-depth Analysis of Unsupervised Clustering for Female Breast Shape Haoyang Xie, Xi Chen, Zhicai Yu, Yueqi Zhong, Kai Lu **Presenter: Haoyang Xie** Donghua University, China

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Abstract-Female breast shape is significantly essential for female healthcare, bra design, etc. However, there is no authoritative standard for breast shape classification. In this paper, we analysis the female breast category by unsupervised clustering the horizontal female breast contours. Specifically, the Elliptic Fourier Descriptors (EFDs), extracted from breast contour, are employed as the contour features. Subsequently, we use PCA to reduce the feature into lower dimensions. Experiments demonstrate that the lower dimensions are enough to present the original features. Then, we employ two widely used clustering algorithms, K-Means++ and FCM, to cluster the female breast contours, and deeply analyze and compare the results of two clustering results in terms of effectiveness. Experimental results demonstrate that the K-Means++ is more suitable for female breast contour clustering, and the results are more reasonable than FCM.

T5001 18:30-18:45	Group-Based Sparse Representation Based on ℓ_p -norm Minimization for Compressive Sensing Ruijing Li, Yechao Bai, Xinggan Zhang, Lan Tang and Qiong Wang **Presenter: Ruijing Li** Nanjing University, China Abstract-Sparse coding has been applied in various domains, especially in image restoration. Most methods depend on the -norm optimization techniques and the patch-based sparse representation models, but they suffer from two limits: one is the high computational complexity in dictionary learning; the other is ignoring the relationship among patches which influences the accuracy of sparse coding coefficients. In this paper, we choose the group-based sparse representation models to simple calculation process and realize the nonlocal self-similarity of images by graph-based transform dictionary design. Besides, we utilize -norm minimization to solve nonconvex optimization problems on the basis of the weighted schatten p-norm minimization, which can make the optimization model more flexible. Through reasonable parameters selection, experimental results show that our proposed method has a better performance on the compressive sensing than many current state-of-the-art schemes in both peak signal-to-noise ratio and visual perception.
T5003 18:45-19:00	Wavelet Based Image Coding via Image Component Prediction Using Neural Networks Takuma Takezawa and Yukihiko Yamashita **Presenter: Takuma Takezawa** Tokyo Institute of Technology, Japan Abstract-In the process of wavelet based image coding, it is possible to enhance the performance by applying prediction. However, it is difficult to apply the prediction using a decoded image to the 2D DWT which is used in JPEG2000 because the decoded pixels are apart from pixels which should be predicted. Therefore, not images but DWT coefficients have been predicted. To solve this problem, predictive coding is applied for one-dimensional transform part in 2D DWT. Zhou and Yamashita proposed to use half-pixel line segment matching for the prediction of wavelet based image coding with prediction. In this research, convolutional neural networks are used as the predictor which estimates a pair of target pixels from the values of pixels which have already been decoded and adjacent to the target row. It helps to reduce the redundancy by sending the error between the real value and its predicted

SESSION II

	value. We also show its advantage by experimental results.
T5006 19:00-19:15	Detection of Brain Tumor in MRI Images Using Watershed and Threshold-Based Segmentation Ghinwa Moussa Tarhini and Reda Shbib **Presenter: Ghinwa Moussa Tarhini** Lebanese International University, Lebanon Abstract-Brain Cells control all body organs including the critical ones where any disorder of these cells will directly cause other organs to malfunction and thus threatens human's life. That is why the brain is considered the most crucial organ in the human body. Disorder of brain cells, appear as inflamed cells in the brain known as a tumor. The early detection of these tumorous cells will increase the possibility of curing disease in a short time. Magnetic Resonance Imaging (MRI) is now used for detection of brain tumor. Image processing and segmentation of the MRI images is now an emerging research field where several techniques have been developed for MRI segmentation and tumor detection like Fuzzy C-Means (FCM) and Support Vector Machine (SVM). In this paper, an efficient algorithm based on threshold segmentation technique, followed by some morphological operations is proposed. The quality of the MRI scanned image is enhanced at first, then threshold segmentation is applied to divide the pixels into different classes, then to detect the tumor part of the image with the highest intensity, morphological operators are applied.
T1082 19:15-19:30	Reconstructing the Three-dimensional Point Cloud of a Draped Fabric Based On a Two-dimensional Projection Zhicai Yu, Yueqi Zhong, Haoyang Xie **Presenter: Zhicai Yu** Donghua University, China Abstract-In order to reconstruct the three-dimensional (3D) point cloud of a draped fabric based on a two-dimensional fabric drape projection, the three-dimensional point clouds of the draped fabrics were scanned with a self-built 3D scanning device. A resampling method based on local linear embedding (LLE) was used to represent different 3D point clouds with the same point number and point sequence. Principle Component Analysis (PCA) was used to reduce the dimension of the resampled 3D point clouds. With PCA, a completed resampled point cloud could be represented with a signature of length fifty-seven. At last, a regression model with a two- dimensional (2D) fabric drape projection as input was constructed and trained to predict the signature of length fifty-seven. With the predicted signature, the 3D point cloud of a draped fabric could be reconstructed. The result shows that all resampled point clouds have the same point number and point sequence. The errors between the reconstructed 3D point clouds and the ground truth are all within 6.92 mm.

Dinner @ Hotel SERHS Rivoli
<19:50-21:30>
Note: Dinner coupon is needed for entering the restaurant.

SESSION III

December 19, 2019
Session III

[Software Engineering and Data Computing]

⏲ 14:00-16:45

Graduation Hall, Fac. of Philology (1/F)

Chaired by Prof. Rogério Rossi

University of São Paulo, Brazil

11 Presentations—

T1047-A, T1018, T1053, T1034, T1035, T1026, T1036, T1056, T2003, T3007, T5007

*Note:

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SESSION III

T1047-A 14:00-14:15	A Survey Of Biometrics and Its Detection Methods Ashraf A. Aly **Presenter: Ashraf A. Aly** LMU University, USA Abstract-Evaluating the previous work is an important part of developing the Biometric Techniques. The term "biometrics" is derived from the Greek words bio (life) and metric (to measure). The aim of this paper is to give a brief overview of the field of biometrics and its recognition methods, and summarize some of its advantages, disadvantages, will be presented. Biometric recognition refers to an automatic recognition of individuals based on a merit vector(s) derived from their physiological and/or behavioral characteristic. Biometric recognition systems should provide a authoritative personal recognition projects to either confirm or determine the identity of an individual. Applications of such a system include mobile phones, credit cards, computer systems security, secure electronic banking, and secure access to buildings, health and social services. By using biometrics a person could be identified based on "who she/he is" rather than "what she/he has" (card, token, key) or "what she/he knows" (password, PIN). In this paper, a brief overview of biometric methods, and their advantages and disadvantages, will be presented.
T1018 14:15-14:30	Early Cost Estimation in Customized Furniture Manufacturing Using Machine Learning O. Kurasova, V. Marcinkevičius, V. Medvedev, and B. Mikulskienė **Presenter: O. Kurasova** Mykolas Romeris University, Lithuania Abstract-Accurate cost estimation at the early stage of a construction project is a key factor in the success of most projects. Many difficulties arise when estimating the cost during the early design stage in customized furniture manufacturing. It is important to estimate the product cost in the earlier manufacturing phase. The cost estimation is related to the prediction of the cost, which commonly includes calculation of the materials, labour, sales, overhead, and other costs. Historical data of the previously manufactured products can be used in the cost estimation process of the new products. In this paper, we propose an early cost estimation approach, which is based on machine learning techniques. The experimental investigation based on the real customized furniture manufacturing data is performed, results are presented, and insights are given.
T1053 14:30-14:45	A Novel Document Weighted Approach for Text Classification S. Sai Satyanarayana Reddy, N. Hanuman Reddy, T. Raghunadha Reddy **Presenter: S. Sai Sayanarayana Reddy** Vardhaman College of Engineering, India Abstract-The textual data in the internet is increasing exponentially through blogs, twitter and various social media sites. The users are not specifying the type of text that they are uploading into the internet. In this regard most of the researchers are looking for automated tools for classifying the data or assigning class label to the unknown documents. Text classification is one such area used for classifying the texts. Several solutions were provided for text classification by the researchers. The text classification approaches generally contains

	collection of training data, preprocessing of the text, features extraction, feature reduction, document representation and finally applying classification algorithms to build the model for class label prediction of a new textual document. In the phases of text classification, the document representation is one important step to increase the efficiency of the accuracy of text classification. In this work, a new document representation approach is proposed. The experimentation conducted on 20-Newsgroup and Reuters-21578 datasets and different types of classification algorithms. Our approach attained best accuracy results for text classification and observed that the results are more promising than most of the popular approaches for text classification.
T1034 14:45-15:00	Chatbot based Solution for Supporting Software Incident Management Process Nagib Sabbag Filho, Rogério Rossi **Presenter: Nagib Sabbag Filho, Rogério Rossi** University of São Paulo, Brazil Abstract-A set of steps for implementing a chatbot, to support decision-making activities in the software incident management process is proposed and discussed in this article. Each step is presented independently of the platform used for the construction of chatbots and are detailed with their respective activities. The proposed steps can be carried out in a continuous and adaptable way, favoring the constant training of a chatbot and allowing the increasingly cohesive interpretation of the intentions of the specialists who work in the Software Incident Management Process. The software incident resolution process accordingly to the ITIL framework, is considered for the experiment. The results of the work present the steps for the chatbot construction, the solution based on DialogFlow platform and some conclusions based on the experiment.
T1035 15:00-15:15	Scrum-Based Application for Agile Project Management André Luiz Garcia, Iury da Rocha Miguel, Jonathan Brendon Eugênio, Marina da Silva Vilela, Guilherme Augusto Barucke Marcondes **Presenter: Guilherme Augusto Barucke Marcondes** National Institute of Telecommunications-Inatel, Brazil Abstract-Nowadays on projects there are a lot of data and requirements involved. Agile methodology can contribute significantly and in an organized way. One important tool for it is Kanban, a board that project team can easily view task status and evolution. This article presents a mobile application developed for delivering Kanban functionality in a project management software (Jira). The application was developed to help the day-by-day processes and a final survey demonstrated that the result was positive, according to the interviewed people.
T1026 15:15-15:30	Processing GIS Data using Decision Trees and an Inductive Learning Method Dana Mihai and Mihai Mocanu **Presenter: Dana Mihai** University of Craiova, Romania Abstract-This paper extends recent work on spatial data mining, with another application of the classification techniques, namely with the Decision tree classifier algorithm. Spatial data

mining represents a various and investigated domain because huge amounts of spatial data have been collected, ranging from remote sensing to geographical information system and computer cartography. In this work we used the Weka tool to implement the C4.5 (Quinlan) Decision tree algorithm on a dataset of Geographic Information System (GIS), data collection called Cadastre formed by a parcel plan from the Dolj district of Romania. The results of the experiments highlight several advantages and also some disadvantages of Decision tree in context of spatial data mining, with a favorable accuracy.

T1036 15:30-15:45	Research on Predicting the Bending Strength of Ceramic Matrix Composites with Process of Incomplete Data Gao Xiang, Li Guanghui, Tan Rong, and Yao Leijiang **Presenter: Gao Xiang** Northwestern Polytechnical University, China Abstract-With the rapid development of machine learning, it is possible to use neural networks to build models to predict performance of Ceramic Matrix Composites (CMCs) with raw materials and environments. In the traditional material science engineering, it always took a long time to develop a new CMC. Furthermore, there is still no theoretical basis providing references to design experiments to develop CMCs with ideal performances. This work proposed a model to predict the bending strength of CMCs with a Convolution Neural Network (CNN) using 8 factors considered to affect the bending strength of CMCs mainly. For the data were all collected from papers published on journals and conferences, and there is no standard to describe an experiment, the incompleteness of data influences the performance of our model seriously. Then we tried several methods to fill the data, finally the regression imputation with a dual-hidden-layer neural network performed a significant improvement of the CNN bending strength prediction model.
T1056 15:45-16:00	PM2.5 Concentration Forecasting Based on Data Preprocessing Strategy and LSTM Neural Network Tao Liang, Gaofeng Xie, Dabin Mi, Wen Jiang and Guilin Xu **Presenter: Tao Liang** Hebei University of Technology, China Abstract-In order to better grasp the change rule of PM2.5 concentration, this paper presents a prediction model of PM2.5 concentration based on Complete Ensemble Empirical Mode Decomposition with Adaptive Noise (CEEMDAN)- Permutation Entropy (PE)-Long Short-Term Memory (LSTM). The PM2.5 concentration time series is decomposed into several sub-sequences with obvious complexity differences by CEEMDAN-PE. Then, the LSTM prediction model is built by adding meteorological parameters to each different sub-sequence. The final results are got by adding the prediction results. The data of four monitoring stations in Tangshan City, Hebei Province is used to implement simulation experiment. Experiment results confirm that the proposed prediction model compared with other combined and single forecasting methods, and shows a high prediction precision, and good universality, which provided effective technical support for pre-control of air pollution.

SESSION III

T2003 16:00-16:15	Segmentations and Models of Statistical Row Data of BCI Signals Galina S. Panayotova and Dimitar A. Dimitrov **Presenter: Galina S. Panayotova** University of Library Studies and Information Technology, Bulgaria Abstract-Of particular interest to researchers today are the opportunities that provide technology for large data to study the activity of the human brain. An effective strategy for processing large amounts of data is segmenting segment data and building models for each segment individually, with further pooling of results. The aim of the paper is to study BCI signals using segmentation and signal modeling. This paper discusses traditional and graphical statistics approaches offering insights into the essence of each segment. In a perspective, the clear signal identification will ensure development mathematical tools and algorithms for electrical devices, such as wheelchairs and other similar devices needed by people with reduced communication and motor abilities.
T3007 16:15-16:30	Topic Tracking Method Using Independent Topic Analysis Kenta Yamamoto, Takahiro Nishigaki and Takashi Onoda **Presenter: Kenta Yamamoto** Aoyama Gakuin University, Japan Abstract-In this paper, we propose a topic tracking method using independent topic analysis. Independent topic analysis is a method for extracting mutually independent topics from the text data by using the independent component analysis. As the volume of information has grown in recent years, there has often been a desire to analyze the transition of topics in time series documents and track the topics. However independent topic analysis is a method to analyze topics of one analysis data, and it is problem that not adapted to time series documents. So that, we extracted topics in each period, and topic transition of time-series documents was analyzed based on the similarity of topics. Also, based on the topic transition of time-series documents, we proposed a method to track the content and appearance period of the topic, and obtained the effective result by the evaluation experiment.
T5007 16:30-16:45	Fast Reconstruction of 1D Compressive Sensing Data Using a Deep Neural Network Youhao Yu and Richard Dansereau **Presenter: Youhao Yu** Carleton University, Canada Abstract-A deep neural network is used to recognize the nonzero positions of a one-dimensional signal in its sparse domain. Unlike classical data reconstruction methods in compressive sensing (CS), such as basis pursuit or recast as a linear programming problem and solved with primal-dual interior point method (PDIPM), the proposed data reconstruction method is inspired by the performance of convolutional neural networks (CNNs) on image edge detection. A CNN is expected to find the nonzero positions of a sequence in the sparse domain. The proposed method trains the CNN with deep residual learning [1] and takes the half-mean-squared-error (HMSE) as the loss function. It is difficult with a CNN to get accurate amplitude of nonzero points directly, but the CNN finds the nonzero positions efficiently. When the nonzero positions are found, lower–upper (LU) matrix factorization with partial

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pivoting can be used to acquire accurate CS reconstruction. The experiments show that the proposed method operates with higher speed and reconstruction accuracy than competing methods.

Coffee Break
<16:45-17:00>

SESSION IV

December 19, 2019

Session IV

[Computer and Information Engineering]

🕐 17:00-19:30

Graduation Hall, Fac. of Philology (1/F)

Chaired by Prof. Galina S. Panayotova

University of Library Studies and Information Technology, Bulgaria

10 Presentations—

T2006, T1022-A, T1033, T2011, T5005, T1048, T1052, T1088,

T1008, T1092

*Note:

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SESSION IV

T2006 17:00-17:15	Development of A Preliminary Usability Guidelines of Mobile Game Applications for Children: From the User Interface Perspectives Amalina Farhi Ahmad Fadzlah, Mohd Afizi Mohd Shukran, Norshahariah Wahab, Muhamad Lazim Talib and Suresh Thanakodi **Presenter: Amalina Farhi Ahmad Fadzlah** National Defence University of Malaysia, Malaysia Abstract-Usability guidelines is an important factor in designing and developing of successful user interfaces, and also the most widely used principle in the field of software engineering that defines the application's demand and usage. Due to this reason, there are strong demands to conduct a study that focuses in developing new usability guidelines to design user interfaces of mobile game applications for children. Therefore, this study aimed at exploring the usability guidelines and investigating the importance of these guidelines in designing the user interfaces for mobile game application to be used among 1 to 3 years old children. As a result, a total number of 87 guidelines in which categorized into 17 usability characteristics were found highly associated in designing usable user interfaces for mobile game applications for these categories of users. This research effort has been in a position to derive a preliminary specification and scheme specifically for designing usable interfaces as well as developing mobile game applications from the perspective of children aged 1 to 3 years old.
T1022-A 17:15-17:30	Empirical Mode Decomposition and Time-Frequency Analysis on Abnormal Heart Sound Signals Daoud Boutana, Nayad Kouras and Messaoud Benidir **Presenter: Daoud Boutana** University of Jijel, Algeria Abstract-Heart Sound Signal (HSs) is very useful in biomedical and can provides information of cardiovascular diseases. Sometimes, the HSs present some murmur mixed with the main components of the signal, the murmur indicates pathological information. The basic goal of the paper consists on HSs segmentation based on the Empirical Mode Decomposition (EMD). The EMD is a method allowing the decomposition of the signal in consideration into a set of Intrinsic Mode Functions (IMFs). Some pathological phonocardiogram signals (PCGs) present a mode mixing case where this method fails. In order to solve this problem, we have used the EMD in conjunction with the noise only model. In addition, we have added a test based on estimation of the correlation coefficient between the first two IMFs in order to discriminate between the signal and the murmur using the Wavelet Packet Transform (WPT). Several real-life signals have been used such as: Early Aortic Stenosis (EAS), Mitral Regurgitation (MR), Opening Snap (OS), and pulmonary Stenosis (PS). Experiments on real pathological PCGs demonstrate that our method makes good results in mode mixing situation.
T1033 17:30-17:45	Scheduling an Operating Room Using a Genetic Algorithm Podcharapol Pongpatcharapun and Wanyok Atisattapong **Presenter: Podcharapol Pongpatcharapun** Thammasat University, Thailand Abstract-Operating rooms (OR) are the largest cost sector and the highest source of revenue

	for a hospital. Since the demand for surgical services overwhelms the capacity of the system, scheduling plays a crucial role in improving hospital service quality. The conventional process of surgery scheduling mainly concerns the surgeons' and the surgical facility's availability, and the patient's readiness. If there are emergency patients that require immediate attention or an elective scheduled operation needs to be postponed, all waiting patients in will be affected. This leads to inefficient use of the OR. In this paper, we propose a genetic algorithm, one of the heuristic methods, to derive an appropriate schedule. The objective is to minimize the closing time of the last OR in use. The algorithm comprises three main processes: initialization, crossover and mutation, and selection. The proposed algorithm was applied to data from Thammasat University Hospital. The results showed that the closing time obtained by the genetic algorithm was the exact solution, achieving a significant reduction in CPU time.
T2011 17:45-18:00	A DBM-Based Ensemble Method for Improving Default Risk Prediction of Peer-To-Peer (P2P) Lending Shan Gao, Xuefeng Wang **Presenter: Shan Gao** Harbin Institue of Technology, China Abstract-With the peer-to-peer lending (P2P) business growing up, the most important influencing factor for the healthy development of this industry is the default risk of borrowers. Because the behavior between lenders and borrowers is real time, naturally large amounts of transaction data are being generated all the time. However, it is difficult to extract useful representative features and choose an appropriate model to predict the default risk of the borrowing behavior. In this paper, we proposed a (Deep Boltzmann Machines) DBM-based ensemble method for the default risk prediction in p2p lending, which is based on the real data generated by Lending Club company. Experimental results on the real world data indicate that our model is more effective and powerful with a 0.9093 explanation power.
T5005 18:00-18:15	A Method Based on SVM Algorithm for Wellbore Collision Monitoring: Using Vibration Signal Characteristics of Bit Drilling in Different Mediums Gang Liu, Dou Mei and Jialin Zhang **Presenter: Dou Mei** China University of Petroleum, China Abstract-During well drilling operations of offshore oil and gas exploration, the progress that bit drills through rocks, steel casing and other mediums produces vibration signal with different characteristics. In this work, we presented a wellbore collision monitoring method that using vibration signal produced by bit penetrating in different drilling mediums to identify those unwanted cases that bit is colliding into adjacent wellbores in drilling operation. Firstly, experiments have been carried out to acquire vibration signal of bit drilling in sorts of rock, cement and steel casing mediums. Then, to dig out signal feature in different time scales, empirical mode decomposition (EMD) method was used to decompose every signal sample into several intrinsic mode functions (IMFs) and we extracted and analyzed characteristics in time and frequency domain of all signal IMFs. Finally, support vector machine classifiers were trained with feature vectors of a part of signal IMFs to realize the function of drilling mediums identification and classification. SVM Performance test results indicate that correct

	identification rate of those classifiers can basically reach 90%. The method presented in this paper proved to be feasible to provide a new approach to monitor wellbore collision risks for offshore drillings.
T1048 18:15-18:30	Modeling and Analyzing of Emergency Vehicle Preemption in a Four-phase intersection via TPN Yandong Pei, Bo Huang, Chunxia Zhao, Gongxuan Zhang, Jiangen Hao and Yan Qiao **Presenter: Yandong Pei** Nanjing University of Science and Technology, China Abstract-Emergency vehicles (EVs) play an important role in public service. And the EV's timeliness and safety are very important. Focusing on the switch of the phases in a four-phase intersection, this paper presents a novel phase-changing model based on timed Petri nets (TPNs) for the traffic light system and proposes a method that uses TPNs to model the preemption of emergency vehicles in such an intersection. Our model ignores many actual details. By controlling the phases, our method ensures that the EVs can pass through the intersection with no or less delay, and the safety of the traffic model on emergency scene can be ensured. To our knowledge, we are the first to employ TPNs to model EV system on a four-phase intersection. The liveness and reversibility of such a TPN model are also verified through the reachability graph of the TPN.
T1052 18:30-18:45	Privacy Leak Detection using Hybrid Analysis Hyunseok Shim, Hongsun Yoon, Souhwan Jung **Presenter: Hyunseok Shim** Soongsil University, Korea Abstract-In Android, several studies have been conducted using Source and Sink to detect information leaks, but have not determined whether the data being leaked is actual personal information. The Android framework also has the problem of allowing apps to take full advantage of user information through single permission. To solve these problems, we propose a tool with static/dynamic analysis. The tool analyzes the Source and Sink used by the target app, to provide users with information on what personal information it used. To achieve this, we extracted the Source and Sink through Control Flow Graph and make sure that it leaks the user's privacy when there is a Source-to-Sink flow. We also used the sensitive permission information provided by Google to obtain information from the Sensitive API corresponding to Source and Sink. Finally, our dynamic analysis tool runs the app and hooks information from each sensitive API. In the hooked data, we got information about whether user's personal information is leaked through this app, and delivered to user. We evaluated our tool on 2,802 APKs, and found 850 APKs that leak personal information with average 110MB of max memory consumption.
T1088 18:45-19:00	Secure Information Hiding Based on Random Similar Bit Mapping Abdul Alif Zakaria and Norli Anida Abdullah **Presenter: Abdul Alif Zakaria** CyberSecurity Malaysia, Malaysia

	Abstract- The goal of cryptography is to maintain the secrecy of information while steganography aims to hide the information. A hybrid steganography and cryptography method was introduced to increase the security of data transmission. Random Similar Bit Mapping (RSBM) was proposed to hide a secret message without modifying the image and generates a Position File (PF) which stores the positions of a hidden message. PF is encrypted using Advanced Encryption Standard (AES) algorithm before being sent to the receiver. Two security measures were proposed to estimate the message location in PF based on Correct Position Finding (CPF) for message detection against a brute force attack. This paper compared related works using the proposed security measures to evaluate its security. From the CPF probability analysis, RSBM produced the lowest CPF probability results, while recording the highest CPF time complexity results in CPF time complexity analysis. In conclusion, RSBM ensured high data security which can be implemented in any information hiding application.
T1008 19:00-19:15	Multi-Dimensional HITS Based on Random Walks for Multilayer Temporal Networks Laishui Lv, Kun Zhang **Presenter: Laishui LV** Nanjing University of Science and Technology, China Abstract-Numerous centrality measures have been established to identify the important nodes in static networks, among them, HITS centrality is widely used as a ranking method. In this paper, we extend the classical HITS centrality to rank nodes in multilayer temporal networks with directed edges. First, we use a sixth-order tensor to represent multilayer temporal network and then introduce random walks in the established sixth-order tensor by constructing six transition probability tensors. Second, we establish tensor equations based on these constructed tensors to obtain six centrality vectors: two for the nodes, two for the layers and two for the time stamps. Besides, we prove the existence of the proposed centrality measure under some conditions. Finally, we experimentally show the effectiveness of the proposed centrality on an synthetic network and a real-world network.
T1092 19:15-19:30	Evaluating the Accuracy of Public Cloud Vendor Face Detection API's Ashling Malone, John Burns **Presenter: Ashling Malone** TU Dublin, Ireland Abstract-The ability to process human face information is crucial in many areas of government, business and social media. Facial recognition provides businesses with the ability to provide services that include; security, robotics, analysis, human resources, mobile applications and user interfaces. Users can access their accounts and sign off transactions online just by taking a 'selfie'. Machine Learning algorithms have been developed for face detection in media such as picture images. In order to recognise a face, the camera software must first detect it and identify the features before making an identification. Face detection is the first step of face recognition. In this research, the face detection APIs from five of the top public cloud vendors of facial recognition software have been tested and evaluated to establish which vendor performs the best for accuracy and to find any significant differences between the vendor APIs. The attributes tested were 'Gender' and 'Age'. Surprisingly the vendor Amazon Rekognition,

IBM and FaceX only offered the attribute age as a range value rather than committing to an exact age. This immediately diminishes the accuracy of their respective APIs. The research proves the weaknesses in API accuracy by testing the resilience of the vendor APIs against degraded images. Azure was the overall winner with Rekognition in second place, Kairos in third, fourth place was IBM and FaceX took last place.

Dinner @ Hotel SERHS Rivoli
<19:50-21:30>
Note: Dinner coupon is needed for entering the restaurant.

SESSION V

December 19, 2019
Session V

[Communication and Information System]

🕐 14:00-16:30

Room 0.1, Philology Building, Ground Floor

Chaired by Prof. Souhwan Jung

Soongsil University, Korea

10 Presentations—

T1058, T1067, T1027, T1085, T1084, T1086, T1096, T2004, T6005, T1049

*Note:

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3. One Best Presentation will be selected from each parallel session and the author of best presentation will be announced and awarded at the end of the session.

SESSION V

T1058 14:00-14:15	Multifactorial Fuzzy Logic Distance Correction for UWB Positioning System Krzysztof Hanzel, Damian Grzechca, Mateusz Tomczyk, Artur Marciniak **Presenter: Krzysztof Hanzel** Silesian University of Technology, Poland Abstract-The paper aims to present the application of fuzzy logic to correct distances obtained from the UWB system. Positioning using the Ultra-Wideband (UWB) system for automotive purposes has many applications (including support for Advanced Driver-Assistance Systems (ADAS) applications in making driving decisions more safe and comfortable). Based on the research carried out by the authors of the article, it appears that the data maintain high precision in certain ranges, but they depend on the many factors like environment, obstacles and the distance in which the positioned objects are located. By using data fusion using fuzzy logic, it is possible to improve the distance value of the UWB system as presented in this article. The result of the research and the proposed correction is the receipt of a wireless system enabling the determination of distances with accuracy to centimeters for a large range of distances.
T1067 14:15-14:30	IOUT Enabled Underwater WSN using Dynamic Adaptive Routing Protocol with Improved Reliability Jasem M Alostad, Nizar Alkateeb, Ebraheem Sultan, Hameed K.Ebraheem **Presenter: Jasem M. Alostad** College of Basic Education, Kuwait Abstract-In this paper, a trade-off between the energy consumption and network lifetime is considered. This paper proposes an optimal routing protocol called Energy Dynamic Adaptive Routing (EDAR) protocol. The DAR protocol maintains a tradeoff between the reliability or packet delivery ratio (PDR) of sensor nodes and Bit Error Ratio (BER) using optimal dynamic adaptive routing approach. The proposed approach operates on three different phases, namely, initialization, dynamic routing and transmission. During initial phase, all the nodes in the UWSN share location and residual energy information among all the nodes in the network. During dynamic routing phase, an optimal Directed Acyclic Graph (DAG) based route selection is exploited to select the neighbor and successor nodes. This facilitates the successive routing to transmit the packets from one node to another. Here, the cost function with directed acyclic graph is utilized for better transmission of packets. The experimental results shows that proposed method encounters the issues raised in conventional protocol and improves the reliability of packets with higher BER.
T1027 Video 14:30-14:45	Security in MANETs Nada Mouchfiq, Ahmed Habbani, and Chaimae Benjbara **Presenter: Nada Mouchfiq** University of Mohammed V, Morocco Abstract-Current research is focused on wireless networks, more recently the Internet of Things and the ad hoc networks that are part of it. The combination of these networks and emerging technologies has identified the concept of the digital environment that has changed people's lifestyles and led to the emergence of new applied sciences. With the evolution that

	the world has experienced following the emergence of several concepts and the rapid development of technologies, security has become increasingly important must identify the different changes in the digital environment, namely data protection personal and professional. In the literature, there are several methods and levels of security. This article will discuss attacks that affect MANETs layers. Then we will discuss the proposed solutions to ensure a high level of security in these networks recalling the last work of our team, finally our article will propose a method of security the most adapted to our needs as a team and this method is based on the principle Software Defined Networks (SDN) that will be applied on MANETs (Mobile ad hoc networks).
T1085 14:45-15:00	UWB Positioning System with the Support of MEMS Sen Sors for Indoor and Outdoor Environment Krzysztof Paszek, Damian Grzechca, Mateusz Tomczyk, Artur Marciniak **Presenter: Krzysztof Paszek** Silesian University of Technology, Poland Abstract-Positioning systems should depend on a number of sub-systems such as global positioning system (GPS), inertial navigation system (INS), lidar, radar, vision systems etc. due to the growing popularity of autonomous vehicles. High accuracy of positioning process must be included due to driving safety (of autonomous vehicles and drivers in vehicles with assistance systems). The paper investigates the movement of a radio-controlled (RC) model. The article presents the process of fusion and filtration on data from ultra-wideband (UWB) and INS systems. It focuses on the error that occurs in the first phase of determining a position, namely when the distance between two nodes is calculated. This error affects further process of data – trilateration, which is the next step to determine the position of objects. A method of data correction based on system information obtained from static measurements is also presented. The tests were carried out both indoors and outdoors, which illustrates the variability of the problem depending on the environment. Reference data for dynamic tests were obtained from a single-stripe lidar.
T1084 15:00-15:15	Cooperative Relay Transmission under Physical Layer Security for Non-Orthogonal Networks Mohammed A. Salem, Azlan B. Abd.Aziz, and Mohamad Y. Alias **Presenter: Azlan B. Abd.Aziz** Multimedia University, Malaysia Abstract- In this paper, the secrecy performance for a downlink cooperative non-orthogonal multiple access (NOMA) communication system is studied under two cases. In the first case, the presence of an untrusted user is studied. While, the presence of an eavesdropper node is considered in the second case. The base station transmits superimposed information signals to the half-duplex two-way relay node. The relay amplifies-and-forwards the received signal towards the users. This paper studies the effectiveness of two factors on the secrecy performance in terms of secrecy capacity. these factors are the power allocated for each user, and the distance between the untrusted user and the cooperative relay node with respect to the strong user. Moreover, this paper proposes the shared jamming signal strategy in order to enhance the physical layer security of the cooperative NOMA in the presence of an eavesdropper node. Furthermore, simulations of the secrecy capacity are presented and

	compared with a conventional scheme based on null-steering jamming scheme. Based on the result the proposed technique outperforms the conventional technique in terms the of secrecy capacity.
T1086 15:15-15:30	A Countermeasure Against Smart Jamming Attacks on Lte Synchronization Signals Mert Eygi and Gunes Karabulut Kurt **Presenter: Mert Eygi** Istanbul Technical University and TURKCELL¸ Turkey Abstract-Long-Term Evolution (LTE) is one of the most frequently used wireless communication technology. As every wireless network, LTE is vulnerable to physical layer (PHY) jamming attacks due to the broadcast nature of channels. Since the jammer attacks are getting smarter and energy efficient, they can target a specific region or physical channel instead of entire band. Targeting the physical LTE downlink synchronization signals (SS) could be the most dangerous objective. In this paper, we investigate LTE PHY jamming attack against only primary and secondary synchronization signals. Jammer detection is performed by using Neyman-Pearson theorem. Then, a countermeasure method is proposed. Simulation results show that the proposed countermeasure can achieve lower pollution and better correct cell id performances during smart jamming attack against SS.
T1096 15:30-15:45	Performance of TCP CUBIC and TCP BBR on IEEE802.11s Mesh Network Katsuya Atsuta, Satoshi Kouya, Naoshi Sakamoto **Presenter: Katsuya Atsuta** Tokyo Denki University, Japan Abstract- In this study, IEEE802.11s mesh networking was formulated as it expected to be widely used because of its convenience. The properties of IEEE802.11s mesh networking were investigated and the results revealed its faulty communication performance in a multi-hop network. This could be explained based on Mathis's theory for loss-based TCP congestion control algorithm that suggests that with an increase in delay, the loss probability decreases the communication performance. Recently, Google proposed TCP Bottleneck Bandwidth and Round-trip propagation time (BBR), both of which may tolerate a high bit error rate. This algorithm does not follow Mathis's model. In this study, we measure the performance of TCP CUBIC and TCP BBR on a mesh network, followed by an evaluation of the properties of this mesh network.
T2004 15:45-16:00	Measuring the Effectiveness of A Radio-Identification System Oleksi S. Bichkov, Volodymyr S. Nakonechnvi, Nataliia V. Lukova-Chuiko, Victoria V. Zhebka, Galina S. Panayotova and Dimitar A. Dimitrov **Presenter: Galina Stoyanova Panayotova** University of Library Studies and Information Technology, Bulgaria Abstract-Conducted measurements of qualitative informative features for object recognition determined the most effective methods for measuring them. For this purpose, it is proposed to use the method of digital spectral analysis "thermal noise", which will provide a significant increase in resolution and measurement accuracy of object characteristics. Experimental studies have shown that to increase the likelihood of correct identification of objects by

	existing radio-technical identification systems, it is necessary to measure the highly informative characteristics of objects - their radar long-range portraits. Measurement of such portraits is proposed to carry out through the use of broadband and especially ultra-wideband signals, with high stability of the complex frequency characteristics of the receiving and transmitting paths of radar stations. In particular, the proposed structure of the construction of an experimental measuring complex and the principle of its operation for measuring radar distance portraits of identification objects.
T6005 16:00-16:15	Real-time Iterative Pre-distortion in Commercial DVBS2X Satellite Modulator Philippe Potier and Christophe Lavallée **Presenter: Philippe Potier** IRT Saint-Exupéry/Embedded systems, France Abstract-In order to meet the ever-increasing demand for satellite throughput, high efficiency amplitude and phase shift keying (APSK) modulation orders have been introduced in the latest revision of the DVBS2X standard, posted in 2015, along with tighter roll-off factors of 0.05 and 0.1, leading to an increase of about 15% in achievable spectral efficiency in the AWGN channel. Nevertheless, nonlinear distortions caused by the on-board high power amplifier (HPA), especially when driven close to saturation, as well as linear distortions induced by the payload channelizing filters (IMUX, OMUX), unravel these benefits unless mitigated. In this context, our institute has developed a powerful pre-distortion technique, based on the so-called small variation algorithm (SVA). Following intensive software simulation campaigns, a proof of concept demonstration was completed using in-house FPGA-based hardware pre-distortion mock-up, confirming that achievable spectral efficiency can be increased by up to 11% thanks to the SVA mitigation technique.
T1049 16:15-16:30	Temporal Link Prediction using Node Centrality and Time Series Ting Zhang, Kun Zhang, Laishui Lv, Xun Li **Presenter: Ting Zhang** Nanjing University of Science and Technology, China Abstract-Link prediction is an important tasks in the area of complex networks. Some networks can be better modeled by temporal networks where the patterns of link appearance and disappearance varying with time. However, most of the previous link prediction researches ignore the temporal behaviors of links. The temporal link prediction needs to predict future links via a known network, considering the temporal relationship of node pairs. We propose a method combining the node centrality with time series. We distinguish the contributions of common neighbors to link generation by their centralities. Compared with benchmark approaches in several temporal networks, the proposed method can improve the accuracy of temporal link prediction efficiently.

Coffee Break
<16:45-17:00>

SESSION VI

December 19, 2019

Session VI

[Intelligent Information System and Automation]

🕐 17:00-19:45

Room 0.1, Philology Building, Ground Floor

Chaired by Prof. Takashi Onoda

Aoyama Gakuin University, Japan

11 Presentations—

T1012, T3002, T1009-A, T1097, T1013, T3019-A, T1066, T1071, T3003, T3005, T4003-A

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SESSION VI

T1012 17:00-17:15	Multi-Objective Genetic Algorithm for Risk-based Life Cycle Cost Analysis Yamur K. Al-Douri, Hussan Al-Chalabi, Jan Lundberg **Presenter: Yamur K. Al-Douri** Luleå University of Technology, Sweden Abstract-The aim of this study has been to develop a two-level multi-objective genetic algorithm (MOGA) to optimize risk-based Life Cycle Cost (LCC) analysis to find the optimal maintenance replacement time for road tunnel ventilation fans. Level 1 uses a MOGA based on a financial risk model to provide different risk percentages, while level 2 uses a MOGA based on an LCC model to estimate the optimal fan replacement time. The proposed model can be used with repairable components, making it applicable, useful and implementable within Swedish Transport Administration. In this study, MOGA operators have selected the cost of maintenance and risk data through the previous levels using different ways to provide different possible solutions. A drawback of the MOGA based on a risk-based LCC model with regard to its estimation is that a late replacement period over 20-year might give unreasonable results for the optimal replacement time of our case study. This result has been confirmed by the experts through different interviews at Trafikverket. Therefore, the MOGA does not provide a good solution for a risk-based LCC.
T3002 17:15-17:30	Scrutiny of Artificial Intelligence (AI) in Rail Transportation: Sydney Metro and Melbourne Metro Rail Stochastic Comparison and Review Koorosh Gharehbaghi, Kathryn Robson, Neville Hurst and Matt Myers **Presenter: Koorosh Gharehbaghi** RMIT University , Australia Abstract-This paper aims to review innovative Artificial Intelligence (AI) apparatus to enhance the rail transportation performance. In this light, the Sydney Metro and Melbourne Metro rail will be compared, since both of these Australian rail networks, employ complex AI as the part of their overall performance enhancement schemes. Globally, the transportation sector is beginning to utilize AI in many aspects of their operations, such as Automated Train Operation (ATO), Intelligent Transportation Systems (ITS) and so on. However, such computerized and mechanical integration will also possess many risks such as reliability and safety concerns. Although, such hazards have been researched profoundly in the past, the purpose of this research is to specifically review and compare the two Australian rail networks and convey their execution. These two case studies further highlight the novel critical aspects of AI in rail transportation sector such as, recalibration through smart system design and automation, nonlinear controls and precise design, modeling and control apparatus and so on. As a part of such a view, different aspects of AI systems such as increased reliability and safety were also investigated. This research found that with such enhancements of system performance, the overall transportation functioning would ultimately be significant improved. Subsequently, AI in the Australian context can be further refined based on comprehensive integration of the key factors.
T1009-A 17:30-17:45	Nursing, Robotics, Technological Revolution: Robotics to Support Nursing Work Song, Young Ae, Kim Hyun Jeong and Lee Hyun Kyong **Presenter: Song, Young Ae** Seoul National University Bundang Hospital, South Korea

	Abstract-Purpose: The purpose of this study was to review the influence of robot systems on nursing and robotics technology. Methods: The research design was a review article. The literature was done to help understand the current status and effects of robotic technology in the healthcare field, both domestic and overseas. The keywords searched were 'Nursing', 'Robot', and 'Patient safety' in Pubmed, CINAHL etc, and 'Nursing Activity', 'Nursing Care Integration Service' in RISS and KISS. Results: In healthcare, robotics is used in five areas; personal care robots, mobility and transfer robots, cognitive and emotional robots, nursing assist robots and care robots in palliative home care settings. Nurses' demands for utilization of robotic systems are high. Especially, if robotics is used for indirect and non-value-added nursing activities, efficiency may increase. Therefore, robotics should be used to help nurses focus on bedside care and perform better nursing care. Conclusion: Future robots and technology can help nurse to provide optimal nursing to patients, and will improve the quality life of patients. It is suggested that nursing research should be actively pursued in the future. Especially, it is an urgent field to improve nursing quality and reduce the burden of nurses.
T1097 17:45-18:00	Credit Card Fraud Detection Model based on LSTM Recurrent Neural Networks Ibtissam Benchaji, Samira Douzi, and Bouabid El Ouahidi **Presenter: Ibtissam Benchaji** University of Mohammed V, Morocco Abstract- With the increasing use of credit cards in electronic payments, financial institutions and service providers are vulnerable to fraud, costing huge losses every year. The design and the implementation of efficient fraud detection system is essential to reduce such losses. However, machine learning techniques used to detect automatically card fraud do not consider fraud sequences or behavior changes which may lead to false alarms. In this paper, we develop a credit card fraud detection system that employs Long Short-Term Memory (LSTM) networks as a sequence learner to include transaction sequences. The proposed approach aims to capture the historic purchase behavior of credit card holders with the goal of improving fraud detection accuracy on new incoming transactions. Experiments show that our proposed model gives strong results and its accuracy is quite high.
T1013 18:00-18:15	Initial Design and Features of an Augmented Reality System for Urban Park Touring and Management Konstantinos P. Ferentinos, Yannis Stavrakas, Harry Nakos, Kostis Pristouris and Myrto S. Barda **Presenter: Konstantinos P. Ferentinos** Hellenic Agricultural Organization "Demeter", Greece Abstract-Urban parks and open green areas are important attractions of environmental interest to city residents and visitors. Careful and well-targeted promotion of these areas, not only enhances the importance of their existence in the urban space, but at the same time can assist in the development of alternative forms of "green tourism", and towards the direction of environmental awareness among citizens, which is particularly important nowadays and crucial for the future of the planet. New technologies are a key tool in enhancing the experience of touring urban parks, as they can make the tour much more attractive, highlighting interesting information about the flora and fauna of the park, as well as various other points of interest. They can also assist park managers in organizing events, thus solving one of the key operating

	problems mainly of large-scale urban parks, which is the failure to exploit their entire site due to reduced or problematic accessibility. This paper presents the initial design methodology and the main features of an integrated system that comprises an augmented reality mobile application for visitors of urban parks, and a corresponding park management web application for the managers of such park. Through the mobile app, an attractive, interactive touring environment will be created which will highlight the environmental and historical interest of those sites. At the same time, the web application will receive multimedia data from the users and will automatically collect anonymous data that may be useful to park managers to improve the visitors' touring experience.
T3019-A 18:15-18:30	A Study on the Prediction Model for Tomato Production Using Smart Farm Big Data Hwa Jong Kim, Seong-Eun Hong **Presenter: Hwa Jong Kim** Kangwon National University, South Korea Abstract-Recently, according to the development of IoT technology and government policy, smart farm greenhouses incorporating ICT technology are gradually spreading in Korea. Domestic smart farm technology outputs the environment information collected from devices and sensors installed in the smart farm and shows it to the user. Accurate predictive model of growth and production of smart farm is the most important technology for improving productivity of smart farm. The final goal of smart farm technology is to predict production volume by using sensor devices installed in smart farm, to derive optimal environment value and to develop technology up to autonomous control stage of internal environment. In this study, we developed a model that predicts the yield of crops by using the farm-specific information from tomato smart farm. R-squared mean scores for individual and average farmers yielded 0.887. In addition, we built a model that calculates and outputs the difference between the average value of the collected farms and the current farm and obtains the output result that can be used for smart farm autonomous control.
T1066 18:30-18:45	Techniques for Reader-Writer Lock Synchronization Bharath Reddy and Richard Fields **Presenter: Bharath Reddy** Schneider Electric, USA Abstract-A shared resource synchronization amongst many processes trying to acquire it is a major source of complexity in uniprocessor and multiprocessor systems. The common way of dealing with such complexity is to exclusively acquire the shared resource by a lock, work on it and then let-go after the resource is no longer needed. A reader-writer lock paradigm is unique in a way that it allows multiple readers to share the resources amongst them as readers are not changing the state of the shared resource or allow a single writer exclusively to write into/or change the shared resource state from A–B. A reader-writer problem is a challenging topic and deserves its own identity. There are many reader-writer algorithms that try to solve and improve the efficiency of this synchronization. With great improvements in computer hardware and subsequently the synchronization methods in the last 2 decades, we attempt to bring all reader-writer locks together. The paper would first examine a general lock and later move on to different kinds of reader-writer locks in the literature to the best of our knowledge.

SESSION VI

T1071 18:45-19:00	An Efficient Intelligent Cache Replacement Policy Suitable for PACS Yinyin Wang, Yuwang Yang and Qingguang Wang **Presenter: Yinyin Wang** Nanjing University of Science and Technology, China Abstract-An efficient intelligent cache replacement policy suitable for picture archiving and communication systems (PACS) was proposed in this work. By combining the Support vector machine (SVM) with the classic least recently used (LRU) cache replacement policy, we have created a new intelligent cache replacement policy called SVM-LRU. The SVM-LRU policy is unlike conventional cache replacement policies, which are solely dependent on the intrinsic properties of the cached items. Our PACS-oriented SVM-LRU algorithm identifies the variables that affect file access probabilities by mining medical data. The SVM algorithm is then used to model the future access probabilities of the cached items, thus improving cache performance. Finally, a simulation experiment was performed using the trace-driven simulation method. It was shown that the SVM-LRU cache algorithm significantly improves PACS cache performance when compared to conventional cache replacement policies like LRU, LFU, SIZE and GDS.
T3003 19:00-19:15	Advanced Rail Transportation System Integration: Factor Analysis of the Sydney Metro's ITS Koorosh Gharehbaghi, Kathryn Robson, Neville Hurst and Matt Myers **Presenter: Koorosh Gharehbaghi** RMIT University , Australia Abstract-This paper aspires to examine advanced rail transportation systems via the utilization of Intelligent Transportation Systems (ITS) as the basis of the key integration. In doing so, the Sydney Metro ITS will be used as a case study. This paper also investigates the different perceptions for diverse rail transportation projects. Ordinarily, cities are composed of complex configurations which are supported by various disparate transport systems. These transport systems in turn require multifaceted judgment and the application of various methodologies. ITS provides an excellent mechanism to simplify a city's complex transport configurations. Nevertheless, the core ITS components require careful integration, and meticulous design perspectives. The ITS integration strategy would also amalgamate crucial transportation issues, including optimized system performance through increased productivity, improved road and traffic safety, and so on. Accordingly, this integration and consolidation of ITS would also further lead to superior overall transportation planning schemes. Such improved planning methods will ultimately facilitate various transportation operators to become better acquainted with the ITS, and to support the making of safer, and more synchronized ITS. Overall, such synchronized ITS also requires a comprehensive process to successfully integrate its components. To assess the Sydney Metro's ITS integration this research utilized the factor analysis method to produce a subsequent model. The model showed the existence of four sub-systems which were evenly distributed, the safety aspects were highly robustly employed. This is the result of Sydney Metro's deployment of a very high safety standard. Such an extreme safety bench-mark, is the pinnacle of the Sydney's advanced rail transportation system.

T3005 Video 19:15-19:30	A Novel Framework for Graph-Based Anomaly Detection. Practical Application to the Missing Trader Fraud Juan Manuel Fernández García-Minguillán, J. Albusac, D. Vallejo, J.J. Castro-Schez and C. Glez-Morcillo **Presenter: Juan Manuel Fernández García-Minguillán** University of Castilla-La Mancha, Spain Abstract-The detection of anomalies has become a very important tool in many fields such as medicine, security, risk analysis, etc. The traditional way of detecting anomalies is basically focused on modeling the characteristics of each entity as a multidimensional point, but such approach has limitations regarding the reuse of the modelling process and the interpretation of the results when they are to be applied in other fields, such as legal. In order to alleviate these problems, it has been proposed to break down a criminological model into a set of reusable and self-explanatory sub-models. As a result, a framework has been developed that allows to define the relevant sub-models together with a decision-support system for the analysis of the entities behavior. For its validation, anonymized data provided by the Spanish Tax Agency have been used for the detection of the missing trader fraud. It has confirmed the effectiveness of using a quasi-local approach to disseminate the value of anomalous factors and the effectiveness of using a multi-objective approach to manage entities according to their importance.
T4003-A 19:30-19:45	Sociality In the Age of Humanoid Artificial Intelligence: A Study of Selected Amazon Alexa Users Santosh K. Patra, Sumana Khan **Presenter: Santosh K. Patra** MICA-School of Ideas, Ahmedabad, India Abstract-Sociality in the age of humanoid artificial intelligence: a study of selected Amazon Alexa users Sociality is the virtue not only common to the human population, rather an instinct of any animal drive it to live together. Many animal/living creature demonstrates the instinct of sociality not only for survival but also for their growth. Unlike many other animals, human sociality is the condition that drives not only human survival but also the creation of the simplest human society to today's complex social order. This socialite can be connected through the works of collectivism of Durkheim while establishing social order. Social order brings the fact of the creation of a society based on the premises of sociality where individuals are not only surviving together but also contributing towards the creation of social structures. While sociality and collectivism create and shape any particular type of social order, the social order becomes the new norm or practice to create a social fact (Durkheim, 1973). These social facts are unique to human society known for the values, cultural norms, and social structures that transcend the individual and can exercise social control (ibid). From the simple tendency of sociality to complex phenomena like social facts, human beings travelled a long to realize the present order of society. These social facts are not only intrinsic to human society but also extrinsic to define social relations. In these complex phenomena of sociality, collectivism and individual self, a layer being added with the computer-mediated co-presence called artificial intelligence. For a longer period of history, the social facts and collectivism were nothing but all about knowledge preservation and reproduction only through human-to-human communication and interaction. However, the added layer of technology with the capacity of knowledge preservation and

reproduction brought human-technology together which can be more value-neutral and independent while representing social facts.

This paper is an attempt to understand the sociological phenomena like collectivism and social facts through the intervention of new-age collective artificial intelligence. Artificial intelligence has not only confined to the human problem solution to mundane societal acts rather has become an integral part of human sociality. For the understanding of human sociality, we have considered exploring the impact of the most popular artificial intelligence device developed by Amazon in the name of Alexa on new-age human sociality.

Dinner @ Hotel SERHS Rivoli
<19:50-21:30>
Note: Dinner coupon is needed for entering the restaurant.

POSTER SESSION

December 19, 2019

Poster Session

🕐 **10:55-11:30**

Room Aula Magna, (1/F)

4 Presentations—
T1011, T2014, T5002, T6001

POSTER SESSION

T1011	Multiobjective Heuristic Scheduling of Automated Manufacturing Systems based on Petri Nets Chong Yu[1], Bo Huang[1] and JianGen Hao[2] [1]Nanjing University of Science and Technology, China [2]Nanjing Les Information Technology Co. Ltd., China Abstract-In practice, automated manufacturing systems usually have multiple, incommensurate, and conflicting objectives to achieve. To deal with them, this paper proposes an extend Petri nets for the multiobjective scheduling of AMSs. In addition, a multiobjective heuristic A* search within reachability graphs of extended Petri nets is also proposed to schedule these nets. The method can obtain all Pareto-optimal schedules for the underlying systems if admissible heuristic functions are used. Finally, the effectiveness of the method is illustrated by some experimental systems.
T2014	Applications of Memristors in Neural Networks and Neuromorphic Computing: A Review Ye-Guo Wang Qingdao University of Science and Technology, China Abstract-Memristor is one of the best choices for neuromorphic computing because of its synapse-like structure and function. The single memristor with ion dynamics enables emulations of diverse synaptic plasticity significant for learning and memory. Moreover, several memristive crossbar arrays show low power consumption, high precision and high efficiency on physically achieving algorithmic functions. Although a large number of experiments have demonstrated great potential of memristive devices in the field of computer architecture design and integrated circuits, there is still a long way to go for their practical industrialization. This review concentrates on the application and function of memristors, as well as some critical challenges and perspectives on their future development.
T5002	Evaluation of Performance Enhancement of OFDM Based on Cross Layer Design (CLD) IEEE 802.11_p Standard for Vehicular Ad-hoc Networks (VANETs), City Scenario Mayada Ahmed and Rashid Saeed Sudan University of Science and Technology, Sudan Abstract-In recent years, Vehicular Ad hoc Network (VANET) plays an important role in Intelligent Transportation Systems (ITS) due to their impact in reducing traffic jams and increasing safety. Dissemination of emergency safety messages is an important function in VANET to realize safety applications. Therefore, short delay dissemination and reliable delivery are required in between vehicles. In fact, IEEE 802.11p is an IEEE physical and MAC standard which intended specially for vehicular communications. In this VANET standard, different physical layer transmission techniques are defined. The latest researches indicate the great potential of employing OFDM for VANET safety applications. In this paper, the performance of VANET city scenario is evaluated in terms of average throughput, delay and PDR. The proposed routing approach which named by Cross Layer Design (CLD) is based on sharing information between physical (PHY) and MAC layers in order to select the best path (route). From the simulation results, we can show that our proposed approach can achieve short delay and maximum Packet Deliver Ratio (PDR) in city environment by simultaneous transmission. The achieved results confirm the best PDR for our proposed technique when there is no movement of communicating vehicles. In addition, the

	proposed routing approach minimizes delay and hence maximizes the throughput comparing with other conventional routing protocols. In addition, a stable behaviour of PDR values is achieved by using CLD approach.
T6001	A new application of Zernike moment to AN／TPY-2 radar Cui rui and Pan jifei Electronic Countermeasure Institute of National University of Defense Technology, China Abstract-The AN/TPY-2 radar becomes a threat to our ballistic missile because it can recognize the shape of targets, such as true warhead and false warhead. The theory of Zernike moment is analyzed in the paper and the jamming effect evaluation model based on Zernike moment is build. According to the change of Zernike moment by different jamming model to AN/TPY-2, the evaluation method is found. The evaluation experiment is carried out and the results of simulation prove the method is corrective and effective.

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