

Conference Program

**2020 The 3rd International Conference
on Computational Intelligence and
Intelligent Systems (CIIS 2020)**

With workshops of:

CAIT 2020 - 2020 International Conference on Artificial
Intelligence Technology

ICAAI 2020 - 2020 The 4th International Conference on
Advances in Artificial Intelligence

EAIT 2020 - 2020 The International Conference on Education
and Artificial Intelligence Technologies

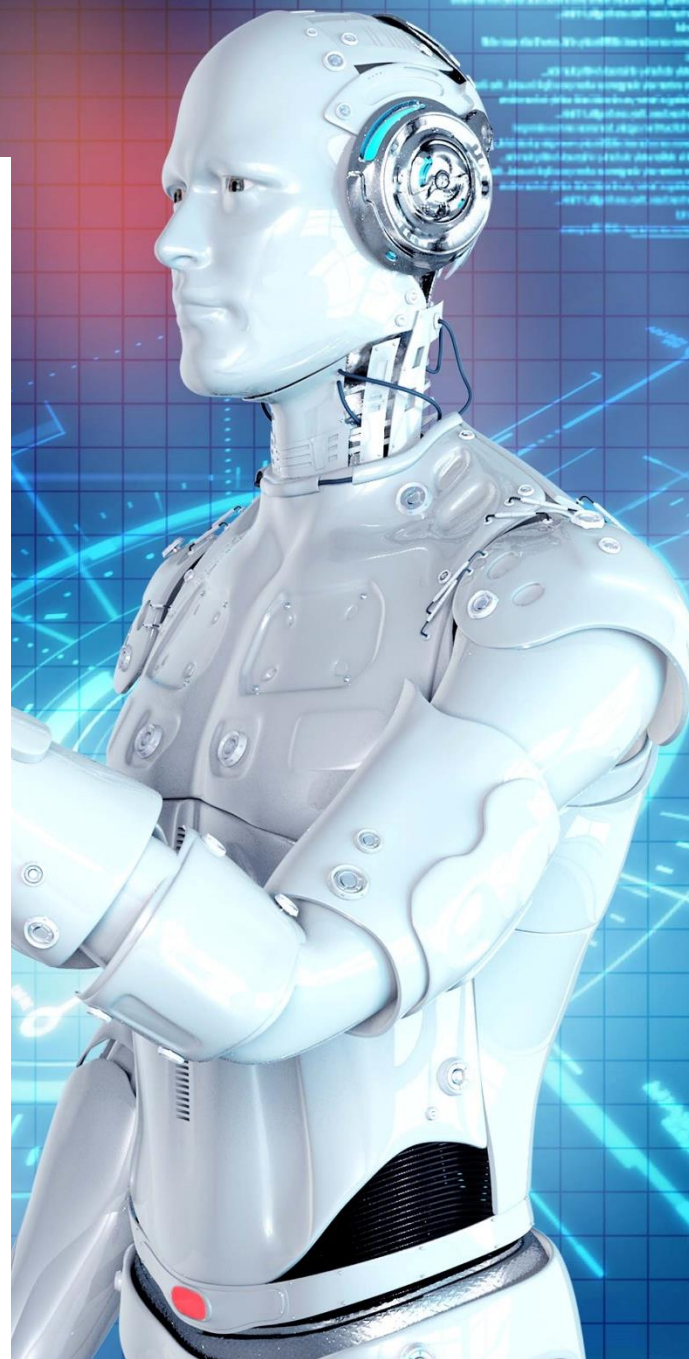
ICBDR 2020 - 2020 The 4th International Conference on Big
Data Research

ICIST 2020 - 2020 The 3rd International Conference on
Intelligent Science and Technology

November 13-15, 2020

Japan Standard Time (JST)

UTC +9



Website: www.ciis.net

Email: ciis_info@sciei.org

Wechat:



ROOM A ID: 638 7066 4836

ROOM B ID: 689 0570 1608

ROOM C ID: 629 9846 4609

CONTENT

Welcome Address	4
Conference Committees	5
Online Presentation Guideline	10
Program Overview	12
Speakers' Profiles	14
Prof. Hayato Yaman, Waseda University, Japan.....	14
Prof. LING Tok Wang, National University of Singapore, Singapore.....	16
Prof. Sergei Gorlatch, University of Muenster, Germany	19
Prof. Adrian Hopgood, University of Portsmouth, UK	21
Prof. Qinmin Yang, Zhejiang University, China	23
Assoc. Prof. Su-Cheng Haw, Multimedia University, Malaysia	25
Industrial Session	27
Session Schedule	28
Presentation Schedule – Check which session are your presentations in.....	28
Session 1: Machine Learning and Neural Network I	29
Session 2: E-commerce and Information Management.....	30
Session 3: Computer and Intelligent Control System	32
Session 4: Artificial Intelligence and Image Processing.....	33
Session 5: Machine Learning and Neural Network II	33
Session 6: Education and Learning.....	35
Session 7: Information Theory and Technology	36
Session 8: Data Analysis and System Engineering	37
Session 9: Intelligent Recognition Technology and Application	38
Session 10: Business Intelligence and Information Management	39
Abstracts	40
Session 1: Machine Learning and Neural Network I	40
Session 2: E-commerce and Information Management.....	42
Session 3: Computer and Intelligent Control System	46
Session 4: Artificial Intelligence and Image Processing.....	50
Session 5: Machine Learning and Neural Network II	53

Session 6: Education and Learning.....	55
Session 7: Information Theory and Technology	56
Session 8: Data Analysis and System Engineering	58
Session 9: Intelligent Recognition Technology and Application	60
Session 10: Business Intelligence and Information Management	62

Welcome Address



We are pleased to welcome you to 2020 The 3rd International Conference on Computational Intelligence and Intelligent Systems (CIIS 2020). CIIS 2020 is going to be held during 13th-15th, November, 2020 virtually, with workshops of 2020 International Conference on Artificial Intelligence Technology (CAIT 2020), 2020 The 4th International Conference on Advances in Artificial Intelligence (ICAAI 2020), 2020 The International Conference on Education and Artificial Intelligence Technologies (EAIT 2020), 2020 The 4th International Conference on Big Data Research (ICBDR 2020) and 2020 The 3rd International Conference on Intelligent Science and Technology (ICIST 2020).

This year, even though CIIS is not able to be held on site as usual, more than 100 papers (including abstracts) have been submitted to the conference and over 60 authors will attend the conference virtually. It is earnestly hoped that that all the participants would enjoy the conference and we cordially invite you to The 4th International Conference on Computational Intelligence and Intelligent Systems, which will be held in Tokyo in 2021, to make up an exciting journey in Japan.

Organizer



Co-organized by



Co-Sponsored by



Technical Supported by



จุฬาลงกรณ์มหาวิทยาลัย
Chulalongkorn University
Pillar of the Kingdom



Conference Committees

Advisory Chair

Tok Wang Ling, National University of Singapore, Singapore

Ronny Hartanto, Rhine-Waal University of Applied Sciences, Germany

Conference Chairs

Sergei Gorlatch, University of Muenster, Germany

Huseyin Seker, Staffordshire University, UK

Yifei Chen, China Agriculture University, China

May Huang, International Technological University, USA

Suash Deb, IICCI, India

Kazuhiko Hamamoto, Tokai University, Japan

Christophe Claramunt, Shanghai Maritime University (China) & Naval Academy Research Institute (France)

General Co-Chair

Arshad Jamal, Northumbria University London Campus, UK

Iwao Fujino, Tokai University, Japan

Jingchang Pan, Shandong University, China

Program Chairs

Ray C.C. Cheung, City University of Hong Kong, Hong Kong

Chui Young Yoon, On Kwang Technology Research Center, Korea

Ratchatin Chanchareon, Chulalongkorn University, Thailand

Xin-She Yang, Middlesex University, UK

Michel Aldanondo, Université de Toulouse, France

Ferdi Sarac, Suleyman Demirel University, Turkey

Karine Zeitouni, University of Versailles, France

Yang Fei, Shandong University, Weihai, China

Program Co-Chairs

Xiaochun Cheng, Middlesex University, UK

Qinmin Yang, Zhejiang University, China

Zhun Fan, Shantou University, China

Ming Zhao, China Agricultural University, China

Bo Ai, Beijing Jiaotong University, China

Ali Luo, The National Astronomical Observatories of the Chinese Academy of Sciences (NAOC), China

Jifu Zhang, Taiyuan University of Science and Technology, China

Local Organizing Chairs

Yumi Asahi, Tokai University, Japan

Naoki Morita, Tokai University, Japan

Local Organizing Committees

Nao Hodoshima, Tokai University, Japan

Hiroyuki Sato, Tokai University, Japan
Keisuke Utsu, Tokai University, Japan
Yuko Hoshino, Tokai University, Japan
Hiroki Yamashita, Tokai University, Japan

Publicity Chairs

K Koteswara Rao, Nan Yang Academy of Sciences, Singapore
Elizabeth Marie Ehlers, University of Johannesburg, South Africa
Hanan Alghamdi, King Abdulaziz University, Saudi Arabia
Su-Cheng Haw, Multimedia University, Malaysia
Gautam Srivastava, Brandon University, Canada
Shuai Liu, Hunan Normal University, China
Xiaoming Kong, Shandong University, China
Max Hoffmann, RWTH Aachen University, Germany
Cyril Ray, Naval Academy Research Institute, France

Publicity Committees

Dong Li, Shandong University, China
Dongliang Xu, Shandong University, China

Special Session Chair

Zhenping Yi, Shandong University, China

Workshop Chairs

Yude Bu, Shandong University, China
Wei Wei, Xi'an University of Technology, China

Web Chair

Renne.Gao, Science and Engineering Institute, USA

Technical Committee Members

Bo Yang, Bowie State University, USA
Matsumoto Mitsuharu, University of electro-communications, Japan
Andrew Chiou, CQUniversity Australia, Australia
Anton Satria Prabuwon, Universiti Kebangsaan Malaysia
Kwan Hyeong Lee, University of Daejin, Korea
Kenji Terabayashi, University of Toyama, Japan
Shailaja Patil, JSPM's Rajarshi Shahu college of Engineering, India
Atsushi Maeda, Osaka Prefecture University College of Technology, Japan
Jiaoyun Yang, Hefei University of Technology, China
Kiran Bailey, BMS College of Engineering Bangalore, India
Jefferson Lerios, Laguna State Polytechnic University, Philippines
Mohammad Dabbagh, Sunway University, Malaysia
Pravin Ghatge, JSPM's Rajarshi Shahu College of Engineering, India
Olga Georgieva, Sofia University, Bulgaria
Sadiq Hussain, Dibrugarh University, India
Marco Antonio T. Subio, Technological Institute of the Philippines Manila, Philippines

P. Aruna, Coimbatore Institute of Technology, India
Rodrigo Jr. Pangantihon, University of Mindanao, Philippines
Semih Özden, Gazi University, Turkey
Kanda Runapongsa Saikaew, Khon Kaen University, Thailand
Nirmala Devi L, Osmania University, India
Sudhir Babu Alaparathi, PVP Siddhartha Institute of Technology, India
Seelam Ch Vijaya Bhaskar, MVSR Engineering College, India
Anitha S, ACS College of Engineering, India
Mohd Najib Mohd Salleh, Universiti Tun Hussein Onn Malaysia, Malaysia
Dariusz Jacek Jakóbczak, Koszalin University of Technology, Poland
Srividya P, Osmania University, India
Tamer Dag, Kadir Has University, Turkey
Kok-Why Ng, Multimedia University, Malaysia
Pakawan Pugsee, Chulalongkorn University, Thailand
Khanista Namee, King Mongkut's University of Technology North Bangkok, Thailand
Siphesihle Philezwini Sithungu, University of Johannesburg, South Africa
Sarat Saharia, Tezpur university, India
Sunarin Chanta, King Mongkut's University of Technology North Bangkok, Thailand
Shie-Jue Lee, National Sun Yat-sen University, Taiwan
Koichi kuzume, National Institute of Technology, Japan
Shahzad Ashraf, Hohai University, China
Weili Zhang, eBay Inc US, USA
Simon X. Liao, The University of Winnipeg, Canada
Jennifer(Qiong) Zhou, California Data Science, USA
Benhur Bakhtiari Bastaki, Staffordshire University, UK
Michał Niezabitowski, Silesian University of Technology, Poland
Hosein Naderpour, Semnan University, Iran
Mohamed Maher Ben Ismail, King Saud University, Saudi Arabia
Adam Cholewa, Silesian University of Technology, Poland
Milos Z. Jovanovic, University of Belgrade, Serbia
Jonah Lissner, Athens Institute for Education & Research, Greece
Aashish A. Bardekar, Sipna College of Engineering & Technology, India
Ryszard Tadeusiewicz, AGH University of Science and Technology, Poland
Sameh Hadouaj, Universite de Tunis, Tunisia
Mohammed Abu Shquier, University of Tabuk, Saudi Arabia
Anna Bzymek, Silesian University of Technology, Poland
Sarah Ibri, UHBC, Algeria
Abdul Rahman A. Alsewari, University Malaysia Pahang, Malaysia
Mehdi Vafakhah, Tarbiat Modarres University, Iran
Tamer Rabie, University of Sharjah, United Arab Emirates
Filipe Portela, University of Minho, Portugal
Nikolaos Matsatsinis, Technical University of Crete, Greece
Erhan Ilhan Konukseven, Middle East Technical University, Turkey
Rozniza Ali, Universiti Malaysia Terengganu, Malaysia
Ricardo Vilalta, University of Houston, United States

Kristina Sutiene, Kaunas University of Technology, Lithuania
Emad Bataineh, Zayed University, United Arab Emirates
Mohamed Basel Almourad, Zayed University, United Arab Emirates
Majdi Beseiso, Al-Balqa Applied University, Jordan
Mehdi Vafakhah, Tarbiat Modares University, Iran
Ali Bou Nassif, University of Sharjah, United Arab Emirates
Gururaj H L, Vidyavardhaka College of Engineering, India
Talal Bonny, University of Sharjah, United Arab Emirates
Heru Susanto, Indonesian Institute of Sciences, Indonesia
Mohd Khalid Awang, Universiti Sultan Zainal Abidin, Malaysia
Mokhairi Makhtar, Universiti Sultan Zainal Abidin, Malaysia
Amin Amini, Brunel University, UK
Toshihiro Matsui, Nagoya Institute of Technology, Japan
Nouredine Elouazizi, University of British Columbia, Canada
Omar Leonel Loaiza Jara, Universidad Peruana Unión, Peru
Nacer Eddine Zarour, University of Constantine 2, Algeria
Habib Hamam, University of Moncton, Canada
Malak Abdullah, Jordan University of Science and Technology, Jordan
Abel Angel Sullon Macalupu, Universidad Peruana Unión, Peru
Chun-Liang Lin, National Chung Hsing University, Taiwan
Hendra Tjahyadi, Universitas Pelita Harapan, Indonesia
Helene Margaretha, Universitas Pelita Harapan, Indonesia
Nemias Saboya Rios, Universidad Peruana Unión, Peru
Samuel Lukas, Universitas Pelita Harapan, Indonesia
Qingzhong Liu, Sam Houston State University, USA
Diab Abuaiadah, Waikato Institute of Technology, New Zealand
Tsai-Yen Li, National Chengchi University, Taiwan
Amar Faiz Zainal Abidin, Universiti Teknologi MARA, Malaysia
Khalaf Khatatneh, BAU, Jordan
S.Selvamuthukumar, A.V.C.College of Engineering, India
Sri Hartati, Universitas Gadjah Mada, Indonesia
Sukarnur Che Abdullah, Universiti Teknologi MARA, Malaysia
Md Abdur Rahman, Jahangirnagar University, Bangladesh
Soon-Geol Lee, Kyung Hee University, Korea
Lin Huang, Metropolitan State College of Denver, China
Abdelmoniem Wahdan, Arab Academy for Science, Egypt
Mohit Gangwar, Bhabha Engineering Research Institute, India
Ishak b. Aris, Universiti Putra Malaysia, Malaysia
Solale Tabarestani, Florida International University, United States
Rajamangala, University of Technology Rattanakosin, Thailand
Bin Xue, National University of Defense Technology, China
Alberto Rebassa-Mansergas, Universitat Politècnica de Catalunya, Spain
Aldo Napoli, Ecole des Mines, France
Ali Kenchaf, ENSTA Bretagne, France
Besma Zeddini, EISTI, France

DAO Minh-Son, National Institute of Information and Communications Technology, Japan
Eyüp Burak Ceyhan, Bartın University, Turkey
Gulustan Dogan, Yildiz Technical University, Turkey
Hu Huafeng, Shanghai Maritime University, China
Maria Malek, EISTI, France
Mohamed Bader-El-Den, University of Portsmouth, UK
Salvatore Distefano, University of Messina, Italy
Sathyan Munirathinam, Micron Technology, Inc., USA
Tahar GHERBI, EISTI, France
Weili Zhang, Google LLC., USA
Xiaohui Han, Shandong Computer Science Center, China
Xin Cao, University of New South Wales, Australia Xuan Guo, University of North Texas, USA
Zeljko Zilic, McGill University, Canada

Online Presentation Guideline



Conference Time Zone

- The conference is arranged based on Japan Standard Time (UTC+9).
- Please carefully check your presentation time, and join the conference 15 minutes in advance.



Online Conference Software

- Download the APP ZOOM on zoom.us or www.zoom.com.cn (China only).
- Learn to use ZOOM via help center: <https://support.zoom.us/hc/en-us>.
- The conference is using 3 virtual rooms.

ROOM A, ID: 638 7066 4836, <https://zoom.com.cn/j/63870664836>

ROOM B, ID: 689 0570 1608, <https://zoom.com.cn/j/68905701608>

ROOM C, ID: 629 9846 4609, <https://zoom.com.cn/j/62998464609>

- Change names in ZOOM:

For regular authors, please rename like Session Number+Paper ID+Name as you join the room.

E.g.: S1+CA1001+Amber Lin.

For Conference Committees, Keynote Speakers and Session Chairs, please rename like CC/KN/SC+ Name.

E.g.: KN+ Amber Lin / SC+ Amber Lin.



Presentation Requirement

- English is the official language in the conference.
- Mute yourselves and turn your cameras on when entering the room.
- Use headsets/Earphones to enhance the audio effect and avoid the speaker echo or howling.
- Stay at a light and quite place.
- Stay online during Keynote & Invited speeches and your own sessions.
- Join **TEST Session** on November 13th.
- Use a stable WIFI/network. If your network is not good, please send us presentation videos within 10 minutes as a back-up.



Voice Controlling During the Conference

- The host will mute all participants while entering the meeting.
- The host will unmute speakers during their presentations.
- Listeners can unmute themselves and communicate freely during Q&A part.
- After Q&A part, the host will mute all listeners.



Oral Presentation Guideline

- Get your presentation sildes or videos prepared.
- A Keynote Speech duration: 45-minute speech and 5-minute Q&A.

-
- A Plenary Speech duration: 35-minute speech and 5-minute Q&A.
 - An Invited Speech duration: 25-minute speech and 5-minute Q&A.
 - A Regular presentation duration: 10-minute speech and 5-minute Q&A. Each presentation should be within 15 minutes.
 - Conference/Session Chairs will remind you when you are out of time.
 - If your network is not stable enough to do presentation online, please record a video as a back-up and send it to the conference secretary at least 1 week before the conference.
 - The whole conference will be recorded. If you mind it, please inform our staff ahead of time.
 - One best Presentation will be chosen from each session and announced at the end of that session. Certificates and receipts will be emailed to you after the conference.
 - Presentation Formulas: **I-S-P-5**
 1. **I**ntroduce yourselves before getting started;
 2. **S**hare you screens;
 3. **P**resent;
 4. **5**-minute Q&A.

If you have any question on ZOOM usage, please email the conference secretary.

Program Overview

November 13th, Friday – Test Session

Test Day	Room A	Room C
11:20-11:30	Prof. LING Tok Wang	
11:30-11:40	Prof. Hayato Yaman	
11:40-11:50	Prof. Qinmin Yang	
11:50-12:00	Assoc. Prof. Su-Cheng Haw	
11:30-12:00		
Lunch Break		
13:00-14:00	Session 2 & Session 5	Session 8 & Session 9 & Session 10
14:30-15:30		Session 3 & Session 6
15:00-15:10	Prof. Adrian Hopgood	
15:10-15:20	Mr. Furkan Tektas	
15:20-15:30	Prof. Sergei Gorlatch	
16:00-17:00		Session 4 & Session 7
18:00-18:10	Prof. Huseyin Seker	

Note: Participants who are not able to join test sessions please inform the conference secretary ahead of time.

November 14th, Saturday – Keynote/Plenary/Invited Speeches and Industrial Session by Bubo.AI

Time	Room A	
9:30-9:35	Opening	Prof. LING Tok Wang, National University of Singapore, Singapore
9:35-10:25	Keynote Speech I	Prof. Hayato Yaman, Waseda University, Japan
10:25-10:40	Morning Break	
10:40-11:30	Keynote Speech II	Prof. LING Tok Wang, National University of Singapore, Singapore
11:30-12:10	Plenary Speech	Prof. Qinmin Yang, Zhejiang University, China
Lunch Break		
Chair: Prof. Huseyin Seker, Staffordshire University, UK		
14:30-15:25	Keynote Speech III	Prof. Sergei Gorlatch, University of Muenster, Germany
15:25-15:40	Break	
15:40-16:30	Keynote Speech IV	Prof. Adrian Hopgood, University of Portsmouth, UK
16:30-17:00	Invited Speech	Assoc. Prof. Su-Cheng Haw, Multimedia University, Malaysia
17:00-17:15	Break	
17:15-18:00	Industrial Session by Bubo.AI (https://www.bubo.ai/) Mr. Furkan Tektas, Data Scientist, Bubo.AI, UK, Prof. Huseyin Seker, Staffordshire University, UK	



November 15th, Sunday – Parallel Sessions

Time	Room A	Room B	Room C
10:30-12:00	Session 1 Machine Learning and Neural Network I		Session 8 Data Analysis and System Engineering
Lunch Break			
13:00-14:45	Session 2 E-commerce and Information Management	Session 5 Machine Learning and Neural Network II	Session 9 Intelligent Recognition Technology and Application
Break			
15:00-16:30	Session 3 Computer and Intelligent Control System	Session 6 Education and Learning	Session 10 Business Intelligence and Information Management
Break			
17:00-18:30	Session 4 Artificial Intelligence and Image Processing	Session 7 Information Theory and Technology	

Keynote Speaker I Profile

Hayato Yaman

Professor

Waseda University, Japan

Speech Title:

Toward Secure Computation Anywhere with Fully Homomorphic Encryption

Biography

Hayato YAMANA received his Dr. Eng. degree at Waseda University in 1993. He began his career at the Electrotechnical Laboratory (ETL) of the former Ministry of International Trade and Industry (MITI), and was seconded to MITI's Machinery and Information Industries Bureau for a year in 1996. He was subsequently appointed Associate Professor of Computer Science at Waseda University in 2000, and has been a professor since 2005. From 2003 to 2004, he was IEEE Computer Society Japan Chapter Chair. Since 2015, he has been director of IPSJ (Information Processing Society of Japan) and vice chairman of information and communication society of IEICE (the institute of electronics, information and communication engineers). At Waseda University, he has been deputy Deputy Chief Information Officer and WasedaX project director since 2015. His research area is big data analysis. Currently, his group engages in Japanese government funded project called "Secure Data Sharing and Distribution Platform for Integrated Big Data Utilization - Handling all data with encryption."



Hayato Yaman

Professor

Waseda University, Japan

Speech Title:

Toward Secure Computation Anywhere with Fully Homomorphic Encryption

Abstract

In recent years, privacy leakage has become a serious concern in various applications, especially client-server applications over the Internet. To tackle the problem, we can adopt several techniques, including secure multi-party computation, differential privacy, and homomorphic encryption (HE); however, only HE enables full secure computation between client and server because HE achieves computation over encrypted data. When adopting fully homomorphic encryption (FHE) proposed by Gentry, an arbitrary number of arithmetic operations (additions and multiplications) over encrypted data is achieved. In this talk, I will pick up several applications, including information retrieval, recommendation, and machine learning, to introduce their implementation with FHE and remained problems.

Keynote Speaker II Profile



Tok Wang LING

Professor

**National University of Singapore,
Singapore**

Speech Title:

Improving the Quality of Database Schema Design, Data Integration, and Keyword Search with ORA-Semantics

Biography

Dr LING Tok Wang is a professor of the Department of Computer Science, School of Computing at the National University of Singapore.

He was the Head of IT Division, Deputy Head of the Department of Information Systems and Computer Science, and Vice Dean of the School of Computing of the University. Before joining the University as a lecturer in 1979, he was a scientific staff at Bell Northern Research, Ottawa, Canada.

He received his Ph.D. and M. Math., both in Computer Science, from University of Waterloo (Canada) and B.Sc. (1st class Hons) in Mathematics from Nanyang University (Singapore).

His research interests include Data Modeling, Entity-Relationship Approach, Object-Oriented Data Model, Normalization Theory, Logic and Database, Integrity Constraint Checking, Semi-Structured Data Model, XML Twig Pattern Query Processing, ORA-semantics based XML and Relational Database Keyword Query Processing.

He has published more than 230 international journal/conference papers and chapters in books, all in database research areas. He also co-edited 13 conference and workshop proceedings, co-authored one book, and edited one book.



Tok Wang LING

Professor

**National University of Singapore,
Singapore**

Speech Title:

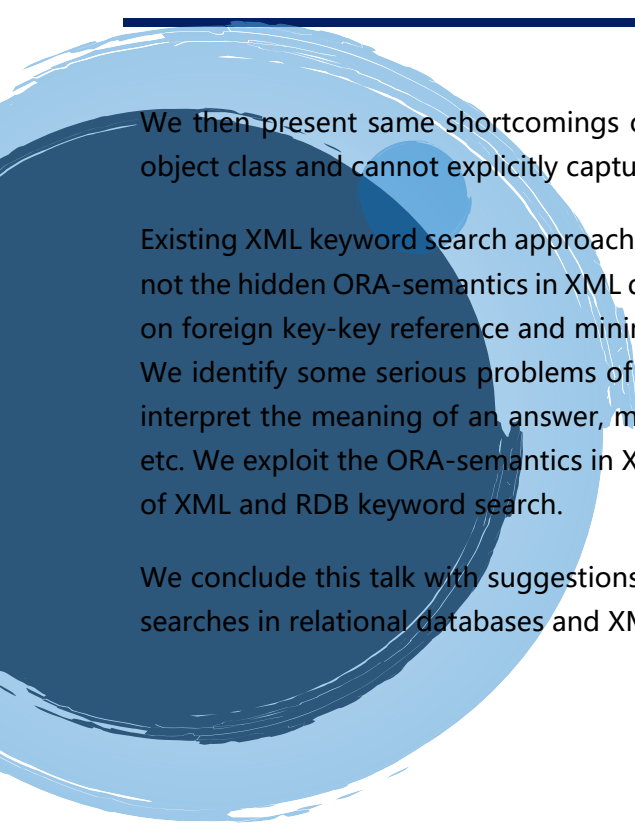
Improving the Quality of Database Schema Design, Data Integration, and Keyword Search with ORA-Semantics

Abstract

The concepts of object class, relationship type, and attribute of object class and relationship type, are the three basic concepts in Entity Relationship Model. They are termed ORA-semantics. In this talk, we first recall the shortcomings of the relational model and XML data model. One serious weak point of these database models is their inability to explicitly represent object classes and relationship types together with their attributes in their schema languages. In fact, these data models have no concepts of ORA-semantics. Without knowing the ORA-semantics in the databases, the quality of some database topics are low. In this talk, we will show how ORA-semantics can be used to significantly improve the quality in database schema design, data and schema integration, and XML and RDB keyword search.

We first present some shortcomings of the relational model such as limitations of normalization theory and the use of Universal Relation Assumption in Relational Model. We then briefly describe and compare the 3 common relational database schema design methods, i.e. decomposition method, synthesizing method, and ER Approach.

In data and schema integration, entity resolution is widely studied. However, we must also consider relationship resolution which is rarely-mentioned; this is to identify different relationship types between/among same set of object classes. We also need to differentiate between primary key vs object identifier (OID), local vs global OID, local vs global functional dependency, semantic dependency vs FD/MVD, and schematic discrepancy among schemas. All these concepts are related to ORA-semantics and they have big impact on the quality of the integrated database and schema.



We then present some shortcomings of the XML data model such as it cannot represent OID of any object class and cannot explicitly capture relationship types, etc.

Existing XML keyword search approaches are all LCA-based; they only rely on the structural features but not the hidden ORA-semantics in XML document. Existing RDB keyword search approaches are all based on foreign key-key reference and minimal connected subgraph which contains all the query keywords. We identify some serious problems of the existing XML and RDB keyword search approaches such as interpret the meaning of an answer, meaningless answer, missing answer, schema dependent answer, etc. We exploit the ORA-semantics in XML data and RDB to improve the correctness and completeness of XML and RDB keyword search.

We conclude this talk with suggestions on further research topics on schema integration and keyword searches in relational databases and XML databases.

Keynote Speaker III Profile



Sergei Gorlatch

Professor

University of Muenster, Germany

Speech Title:

Distributed Applications Based on Mobile Cloud and Software-Defined Networks

Biography

Sergei Gorlatch is Full Professor of Computer Science at the University of Muenster (Germany) since 2003. Earlier he was Associate Professor at the Technical University of Berlin, Assistant Professor at the University of Passau, and Humboldt Research Fellow at the Technical University of Munich, all in Germany. Prof. Gorlatch has more than 200 peer-reviewed publications in renowned international books, journals and conferences. He was principal investigator in several international research and development projects in the field of software for parallel, distributed, Grid and Cloud systems and networking, funded by the European Community and by German national bodies.



Sergei Gorlatch

Professor

University of Muenster, Germany

Speech Title:

Distributed Applications Based on Mobile Cloud and Software-Defined Networks

Abstract

We consider an emerging class of challenging software applications called Real-Time Online Interactive Applications (ROIA). ROIA are networked applications connecting a potentially very high number of users who interact with the application and with each other in real time, i.e., a response to a user's action happens virtually immediately. Typical representatives of ROIA are multiplayer online computer games, advanced simulation-based e-learning and serious gaming. All these applications are characterized by high performance and QoS requirements, such as: short response times to user inputs (about 0.1-1.5 s); frequent state updates (up to 100 Hz); large and frequently changing numbers of users in a single application instance (up to tens of thousands simultaneous users). This talk will address two challenging aspects of software for future Internet-based ROIA applications: a) using Mobile Cloud Computing for allowing high application performance when a ROIA application is accessed from multiple mobile devices, and b) managing dynamic QoS requirements of ROIA applications by employing the emerging technology of Software-Defined Networking (SDN).

Keynote Speaker IV Profile

Adrian Hopgood

Professor

University of Portsmouth, UK

Speech Title:

A Brief History of Artificial Intelligence

Biography

Adrian Hopgood is Professor of Intelligent Systems at the University of Portsmouth, where he is Director of the Future & Emerging Technologies theme and of the South Coast Centre of Excellence in Satellite Applications. He is also a visiting professor at the Open University and at Sheffield Hallam University. He is a Chartered Engineer, Fellow of the BCS (the Chartered Institute for IT), and a committee member for the BCS Specialist Group on Artificial Intelligence.

Professor Hopgood has extensive experience in both academia and industry. He has worked at the level of Dean and Pro Vice-Chancellor in four universities in the UK and overseas, and has enjoyed scientific roles with Systems Designers PLC and the Telstra Research Laboratories in Australia. His main research interests are in artificial intelligence and its practical applications. He has supervised 19 PhD projects to completion and published more than 100 research articles. His textbook "Intelligent Systems for Engineers and Scientists" is ranked as a bestseller and its fourth edition is due in 2021.



Adrian Hopgood

Professor

University of Portsmouth, UK

Speech Title:

A Brief History of Artificial Intelligence

Abstract

Artificial Intelligence (AI) has been a subject of research for 70 years, from the arguable starting point of Alan Turing's seminal paper in 1950. Since then, there have been waves of enthusiasm for new techniques that have resulted in many practical applications. This presentation will explore some of the ups and downs of AI and discuss the reasons for the current excitement around machine learning. Explicit knowledge-based forms of AI, such as expert systems, dominated the early developments in AI. These techniques can be distinguished from data-driven computational intelligence such as artificial neural networks for machine learning. Specific milestones in the development of both families of AI techniques will be highlighted. It will be argued that, while the latest generation of machine-learning algorithms are useful, they can only exhibit intelligent behaviour when combined with other AI techniques.

Plenary Speaker Profile

A circular portrait of Qinmin Yang, a man with glasses and a dark shirt, set against a light blue background with a brushstroke effect.

Qinmin Yang

Professor

Zhejiang University, China

Speech Title:

Theoretical research and practice in data driven design for wind energy

Biography

Qinmin Yang received the B.S., M.S., and Ph.D. degrees from Civil Aviation University of China, Chinese Academy of Sciences, and University of Missouri-Rolla, respectively. From 2007 to 2008, he was a Post-doctoral Research Associate at University of Missouri-Rolla. From 2008 to 2009, he was an advanced system engineer with Caterpillar Inc. From 2009 to 2010, he was a Post-doctoral Research Associate at University of Connecticut. Since 2010, he has been with the State Key Laboratory of Industrial Control Technology, the College of Control Science and Engineering, Zhejiang University, China, where he is currently a professor. He has also held visiting positions in University of Toronto and Lehigh University. He has been serving as an Associate Editor for IEEE Transactions on Systems, Man, and Cybernetics: Systems, IEEE Transactions on Neural Networks and Learning Systems, Transactions of the Institute of Measurement and Control, and Automatica Sinica. His current research interests include intelligent control, renewable energy systems, smart grid, and industrial big data.



Qinmin Yang

Professor

Zhejiang University, China

Speech Title:

Theoretical research and practice in data driven design for wind energy

Abstract

Wind energy has been considered to be a promising alternative to current fossil-based energies. Large-scale wind turbines have been widely deployed to substantiate the renewable energy strategy of various countries. In this talk, challenges faced by academia and industrial communities for high reliable and efficient exploitation of wind energy are discussed. Industrial big data driven schemes are designed to enhance performance and predict faults of wind turbines. Theoretical results and attempts for practice are both present.

Invited Speaker Profile



Su-Cheng Haw

Associate Professor

Multimedia University, Malaysia

Speech Title:

Retailer-based Recommender Systems: Challenges and Opportunities

Biography

Su-Cheng Haw is Associate Professor at Faculty of Computing and Informatics, Multimedia University, where she leads several funded research on the XML databases. Her research interests include XML databases, query optimization, database tuning, data modeling, data management, and data warehousing. She has published around 90 articles in reputable journals and conferences.

She serves in several editorial boards and participated as technical committee member and reviewer boards for several international conferences and journals. Besides, she also received several ad-hoc invitations to review journal/conference articles.



Su-Cheng Haw

Associate Professor

Multimedia University, Malaysia

Speech Title:

Retailer-based Recommender Systems: Challenges and Opportunities

Abstract

Recommender system has been a useful tool especially in the area of Big Data. There is a need for people to filter the information to search for their needs efficiently and relevantly. E-commerce website such as Amazon and Netflix have been using recommender system to build and boost their sales through the personalization recommendation. In addition, it is crucial that a Recommender System is able to provide an unified approach to visualize the interactions level of data, i.e., filter out the unnecessary, and provides the most relevant processed data for decision making purpose. In this talk, some existing recommender system will be discussed focusing in retailer and e-commerce domain. In addition, some possible research direction will be discussed based on the current trends and problems.

Industrial Session

by Bubo.AI (<https://www.bubo.ai/>)

Mr. Furkan Tektas¹

Prof. Huseyin Seker²

¹Data Scientist, Bubo.AI, UK

²Staffordshire University, UK

Speech Title:

Artificial Intelligence and Big Data Analytics in Practice

Abstract

Every sector is becoming more data-driven and automated through the development of advanced data analytics, artificial intelligence and machine learning methods. Therefore, companies need to be harnessing the data more wisely to outperform their competitors in such a competitive environment. This workshop will cover practical aspect of data-driven economy along with successfully developed and deployed projects in industry.

Session Schedule

Presentation Schedule – Check which session are your presentations in.

Session 1	AR1004, AR1006, AR1025, AR1031, C1004, C1016
Session 2	AR1002, AR1010, AR1028, AR1033, C1013-A, C1015, C1017
Session 3	AR1026, C1001, C1003, C1007, C1012-A, C1014-A
Session 4	AR1011, AR1014, AR1027, C1005, C1008, C1010, CA11001
Session 5	CA1006, CA1007, CA1014, CA1017, CA2011
Session 6	CA2002, CA2006, CA2007, CA2012
Session 7	CA1001, CA1010, CA1011, CA1013, CA1015
Session 8	R004, R005, R020, R021, R1002
Session 9	R003, R007, R022, R023, R1001
Session 10	R0002, R0004, R001, R006, R1003

Session 1: Machine Learning and Neural Network I

10:30-12:00, November 15th, Sunday

ROOM A ID: 638 7066 4836

Session Chair:

Time	Paper ID	Title
10:30-10:45	AR1004	Context-based Trajectory Prediction with LSTM Networks Dr. Xin Xu Nanjing Research Institute of Electronic Engineering, China
10:45-11:00	AR1006	A Convolution Neural Network Based on Residual Learning for Image Steganalysis Mr. Yuanbin Wu , Qingyan Li, Lin Li Jimei University, China
11:00-11:15	AR1025	Fighting Fake News Using Deep Learning: Pre-trained Word Embeddings and the Embedding Layer Investigated Mr. Gereme Fantahun Bogale , William Zhu University of Electronic Science and Technology of China, China
11:15-11:30	AR1031	Machine Computing Function Designing for Creative Thinking Prof. Zhu Ping Tellhow Group Ltd., China
11:30-11:45 India Time (IST): 8:00-8:15	C1004	Soil Moisture Prediction Using Machine Learning Techniques Ms. Sagarika Paul , Satwinder Singh Central University of Punjab, India
11:45-12:00 Vietnam Time: 9:45-10:00.	C1016	Efficient Low-Latency Dynamic Licensing for Deep NeuralNetwork Deployment on Edge Devices Mr. Toan Van Pham , Ngoc Quang Tran Ngo, Hoang Minh Pham, Tam Minh Nguyen, Thanh Minh Ta Sun-Asterisk R&D Lab, Vietnam

Session 2: E-commerce and Information Management

13:00-14:45, November 15th, Sunday

ROOM A ID: 638 7066 4836

Session Chair:

Time	Paper ID	Title
13:00-13:15	AR1002	Research on Intelligent Question Answering System Based on College Enrollment Prof. Bo Song , Xiao-Mei Li Shenyang Normal University, China
13:15-13:30	AR1010	Memory Network Based Knowledge Driven Model for Response Generation in Dialog System Mr. Wansen Wu , Xinmeng Li, Qunjun Yin National University of Defense Technology, China
13:30-13:45	AR1028	CrimeSTC: A Deep Spatial-Temporal-Categorical Network for Citywide Crime Prediction Ms. Yue Wei , Weichao Liang, Youquan Wang, Jie Cao Nanjing University of Finance and Economics, China
13:45-14:00 India Time (IST): 10:15-10:30	AR1033	Ensemble Methods with Bidirectional Feature Elimination for Prediction and Analysis of Employee Attrition Rate During Covid-19 Pandemic Mr. Yash Vijay Mate , Atharva Sameer Potdar, Priya RL Vivekanand Education Society's Institute of Technology (VESIT), India
14:00-14:15	C1013-A	Analysis and Generation of the Narrative Elements in a "Dojoji" Story Ms. Miku Kawai , Jumpei Ono, Takashi Ogata Iwate Prefectural University, Japan
14:15-14:30	C1015	Hyperbolic Attributed Network Embedding with Self-adaptive Random Walks Ms. Bin Wu , Yijia Zhang, Yuxin Wang Dalian University of Technology, China

14:30-14:45	C1017	Dynamic Portfolio Management Based on Pair Trading and Deep Reinforcement Learning Ms. Fucui Xu , Shan Tan Huazhong University of Science and Technology, China
-------------	-------	--

Session 3: Computer and Intelligent Control System

15:00-16:30, November 15th, Sunday

ROOM A ID: 638 7066 4836

Session Chair:

Time	Paper ID	Title
15:00-15:15 Moscow, Russia Time 10:00-10:15	AR1026	Intelligent Control System of Optimal Oil Manufacturing Production Mr. Mohamed Yassine Hanafi Peter the Great St. Petersburg Polytechnic University, Russia
15:15-15:30	C1014-A	Programmed Narrative Units Using the Verb Conceptual Dictionary of an Integrated Narrative Generation System Mr. Takuya Ito , Jumpei Ono, Takashi Ogata Iwate Prefectural University, Japan
15:30-15:45	C1003	Iterative Learning Control of Functional Electrical Stimulation Based on Joint Muscle Model Jiaming Zhang, Lin Zhang, Shaocong Gu, Min Li, Wei Meng, Prof. Qingsong Ai , Quan Liu Wuhan University of Technology, China
15:45-16:00 South Africa Time: 10:45-11:00	C1007	A Reinforcement Learning-Based Classification Symbiont Agent for Dynamic Difficulty Balancing Mr. Siphesihle Philezwini Sithungu, Prof. Elizabeth Marie Ehlers University of Johannesburg, South Africa
16:00-16:15	C1012-A	Implementation of an Explanation Generation Mechanism Using Attribute Frames and a Noun Conceptual Dictionary Dr. Jumpei Ono , Miku Kawai, Takashi Ogata Aomori University, Japan
16:15-16:30	C1001	Improved Rehabilitation Robot Trajectory Regeneration by Learning from the Healthy Ankle Demonstration Yunkai Wang, Prof. Qingsong Ai , Ling Ai, Quan Liu, Jiwei Hu, Zude Zhou Wuhan University of Technology, China

Session 4: Artificial Intelligence and Image Processing

17:00-18:30, November 15th, Sunday

ROOM A ID: 638 7066 4836

Session Chair: Prof. Sergei Gorlatch, University of Muenster, Germany

Time	Paper ID	Title
17:00-17:15	AR1011	A Novel Method for Satellite Monitoring with One-dimension Feature Based on Autoencoder Model Dr. Hu Di China Academy of Space, China
17:15-17:30 UK Time: 8:15-8:30	AR1027	Omnidirectional Robot Indoor Localisation Using Two Pixy Cameras and Artificial Colour Code Signature Beacons Dr. Zeyad Al-Shibaany , Mohanad Nihad Noaman, Saba Al-Wais Cardiff University, UK
17:30-17:45 South Africa Time: 10:30-10:45	C1005	Detecting, Contextualizing and Computing Basic Mathematical Equations from Noisy Images Using Machine Learning Mr. Daniel Ogwok , Elizabeth Marie Ehlers University of Johannesburg, South Africa
17:45-18:00	AR1014	Part-Based Pedestrian Attribute Analysis Assis. Prof. Xue Chen , Jianwen Cao Chinese Academy of Sciences, China
18:00-18:15	C1010	Automatic Identification of Braille Blocks by Neural Network Using Multi-channel Pressure Sensor Array Yudai Murakami, Haruko Masuda, Prof. Koichi kuzume National Institute of Technology, Yuge College, Japan
18:15-18:30 South Africa Time: 11:15-11:30	C1008	Cheat Detection in a Multiplayer First-Person Shooter Using Artificial Intelligence Tools Mr. Ruan Spijkerman , Elizabeth Marie Ehlers University of Johannesburg, South Africa
18:30-18:45 Belgium Time: 10:30-10:45	CA11001	Learning Symbolic Action Definitions from Unlabelled Image Pairs Ms. Helen Harman, Pieter Simoens Ghent University - imec, Belgium

Session 5: Machine Learning and Neural Network II

13:00-14:15, November 15th, Sunday

ROOM B ID: 689 0570 1608

Session Chair:

Time	Paper ID	Title
13:00-13:15 Kuwait Time: 7:00-7:15	CA1006	10K LOGO DATASET FOR MACHINE LEARNING LOGO RETRIEVAL PURPOSES Mrs. Fatema Bader Jasem , Khalid Alzamel Kuwait University, Kuwait
13:15-13:30 Iran Time: 7:45-8:00	CA1007	A Method for Improving Unsupervised Intent Detection Using Bi-LSTM CNN Cross Attention Mechanism Dr. Hamid Reza Sadeghi , Saeed Shiry Ghidary, Benhur Bakhtiari Bastaki Mirkabir University of Technology, Iran
13:30-13:45 Iraq Time: 7:30-7:45	CA1014	A Comparative Study of Parkinson Disease Diagnosis in Machine Learning Dr. Mohammed Younis Thanoun, Mohammad Tariq Yaseen University of Mosul, Iraq
13:45-14:00	CA1017	Application of Artificial Neural Network for Daily Evaporation Forecasting Using Weather Data Mr. Hantian Liu Beijing University of Technology, China
14:00-14:15 Turkey Time: 7:00-7:15	CA2011	CnnSound: Convolutional Neural Networks for the Classification of Environmental Sounds Assist. Prof. Özkan İNİK , Huseyin Seker Tokat Gaziosmanpasa University, Turkey

Session 6: Education and Learning

15:00-16:15, November 15th, Sunday

ROOM B ID: 689 0570 1608

Session Chair: Assoc. Prof. Yang Chen, Harbin Institute of Technology, China

Time	Paper ID	Title
15:00-15:15 Vietnam Time: 13:00-13:15.	CA2006	Transitioning from Traditional Learning to Blended Learning at Some Public Universities in Vietnam after the Covid-19 Pandemic Hien Thi Thu Dao, Ms. Thu Le Thi Kim FPT University, Vietnam
15:15-15:30	CA2002	The Current Situation of Senior High School Students Learning Mathematics with Online Problem-Solving Searching Software Ms. Xintong Yang Northeastern University at Qinhuangdao, China
15:30-15:45 Vietnam Time: 13:30-14:45	CA2007	The Importance of Soft Skills for University Students in 21st Century Ms. Anh Pham Thi Van , Hien Thi Thu Dao FPT University, Vietnam
15:45-16:00	CA2012	Design of Deep Learning Experiment Teaching Case Based on EMG Signal Analysis Li Huiyong, Mr. Zhang Yifan , Wang Yiting Beihang University, China

Session 7: Information Theory and Technology

17:00-18:15, November 15th, Sunday

ROOM B ID: 689 0570 1608

Session Chair:

Time	Paper ID	Title
17:00-17:15	CA1001	The Application of Machine Learning in Activity Recognition with Healthy Older People Using a Batteryless Wearable Sensor Mr. Zitong Zhou Nanjing University of Chinese Medicine, China
17:15-17:30 Brazil Time: 7:15-7:30	CA1010	Comparison of LSTM, GRU and Hybrid Architectures for usage of Deep Learning on Recommendation Systems Mr. Mario Leandro Pires Toledo , Marcelo Novaes de Rezende Instituto de Pesquisas Tecnológicas do Estado de São Paulo, Brazil
17:30-17:45 Algeria Time: 9:30-9:45	CA1011	Using Multi-Agent Microservices for a Better Dynamic Composition of Semantic Web Services Ms. Zouad Sara , Boufaida Mahmoud Larbi Ben Mhidi University, Algeria; LIRE Laboratory Abdelhamid Mehri – Constantine 2 University, Algeria
17:45-18:00 Thailand Time: 15:45-16:00	CA1013	Increase the System Utilization by Adaptive Queue Management System with Time Restricted Reservation Mr. Varis Limlawan , PORNTHEP ANUSSORNNITISARN Kasetsart University, Thailand
18:00-18:15	CA1015	DF-map: A Novel Variable Resolution Decision Forest Map for Localization Mr. Shizhen Li , Tao Wu, Li Wang, Zhiyu Wan National University of Defense Technology, China

Session 8: Data Analysis and System Engineering

10:30-11:45, November 15th, Sunday

ROOM C ID: 629 9846 4609

Session Chair: Prof. Iwao Fujino, Tokai University, Japan

Time	Paper ID	Title
10:30-10:45	R004	Analysis of Measure Fluctuation Based on Adtributor Algorithm Mr. Zhao Yanjie , Duan Xiaochen, Kang Lin iQIYI, China
10:45-11:00	R005	Research on Data Security Protection Method Based on Improved K-means Clustering Algorithm Ms. Jinghui Cai , Dashun Liao, Jianqiu Chen, Xue Chen, Tingting Liu, Jialin Xi Jinan University, China
11:00-11:15	R020	Research on EDP Migration Policy based on BP Neural Network and Cellular Automata Model Ms. Zhe Zhang , Xingjian Yuan China agricultural university, China
11:15-11:30 San Diego Time: 18:15-18:30	R021	Data Association Rules Mining Method Based on Improved Apriori Algorithm Mr. Haotong Wu University of California San Diego, USA
11:30-11:45	R1002	Design of Dial-type Spectrum Visualization System Mr. Guo Fengyue , Jingchang Pan, Cao Zhi Shandong University, China

Session 9: Intelligent Recognition Technology and Application

13:00-14:15, November 15th, Sunday

ROOM C ID: 629 9846 4609

Session Chair:

Time	Paper ID	Title
13:00-13:15	R003	Pyramid Deconvolution Net: Breast Cancer Detection Using Tissue and Cell Encoding Information Mr. Dong Sui , Maozu Guo, Yue Zhang, FEI YANG, RUI ZHANG, Lei Zhang Beijing University of Civil Engineering and Architecture, China
13:15-13:30	R007	Captcha Recognition Based on Deep Learning Ms. Li Zhou , JIALING Wang, WEIGANG LU, FEI YANG, RUI ZHANG, LEI ZHANG Electrical & Information Engineering Shandong University, China
13:30-13:45	R022	A Visual Method for Ship Encounter Pattern Recognition Based on Fuzzy Theory and AIS Data Dr. Zhao Liangbin , Fu Xiuju IHPC, Astar, Singapore
13:45-14:00	R023	Spatial Distribution and Epidemiological Characteristics of Foodborne Disease in Zhejiang Province, China Ms. Ying Li , Juan Yang, Xueli Wang Beijing University of Posts and Telecommunications, China
14:00-14:15	R1001	Face Recognition from Art Face Images Based on Deep Learning Ms. Zhexin Liang Zhejiang University, China

Session 10: Business Intelligence and Information Management

15:00-16:15, November 15th, Sunday

ROOM C ID: 629 9846 4609

Session Chair: Prof. Adrian Hopgood, University of Portsmouth, UK

Time	Paper ID	Title
15:00-15:15	R0002	Short-term Traffic Flow Prediction Based on Multi-Auxiliary Information Kai Zhang, Mr. Buliao Jia , Yuhan Dong Tsinghua Shenzhen International Graduate School, China
15:15-15:30 India Time (IST): 11:45-12:00	R0004	LAC: LSTM AUTOENCODER with Community for Insider Threat Detection Sudipta Paul, Dr. Subhankar Mishra National Institute of Science, Education and Research Bhubaneswar India, India
15:30-15:45	R001	Stock Selection Strategy Based on Support Vector Machine and eXtreme Gradient Boosting Methods Ms. LIU Haoyue Shanghai University, China
15:45-16:00	R006	Prediction Method of User's Consumption Behavior in E-commerce Platform Based on RNN Optimization Algorithm Ms. JingHui Cai , Tianyu Xia, Yue Qi Jinan University, China
16:00-16:15	R1003	Design of Dynamic H-R Diagram System Mr. Cao Zhi , Jingchang Pan, Guo Fengyue Shandong University, China

Abstracts

Session 1: Machine Learning and Neural Network I

AR1004

Context-based Trajectory Prediction with LSTM Networks

Dr. Xin Xu

Nanjing Research Institute of Electronic Engineering, China

Traditional target trajectory prediction model is generally trained on the previous trajectories purely while the context information of the trajectory is simply ignored. We assume that the trajectory pattern generally associates with a certain set of positions. For instance, the travelling trajectories of people of similar interest may be highly correlated. Such kind of context information provides more clues for trajectory prediction. As a result, context information should be utilized during trajectory predictions. Inspired by the above issue, we have designed an effective context-based trajectory prediction method with two types of LSTMs. The first type of LSTM model is specially built to predict the distinctive pattern that the trajectory follows while the other type of LSTM models are designed to predict the future positions of the trajectory given the context of the pattern it follows. First, we convert the real-valued target trajectories into discrete path sets with grids. And then we discover the distinctive patterns with hierarchical clustering. The context of the trajectory is modeled as the closest grid of the associated pattern. Later, we train the two types of LSTM models with the corresponding samples. Lastly, we apply the LSTM models for trajectory prediction. Experimental results indicate that our method outperforms the traditional LSTM neural networks significantly by making use of the context information of the trajectory.

AR1006

A Convolution Neural Network Based on Residual Learning for Image Steganalysis

Mr. Yuanbin Wu, Qingyan Li, Lin Li

Jimei University, China

Image steganalysis is a very important technology for forensics. Recent studies show that the idea of steganalysis based on Convolutional Neural Network (CNN) is feasible. In this paper, we propose a novel digital image steganalysis model based on CNN. Compared with the existing CNN-based methods, the CNN model proposed to this paper has two characteristics. First, in the front of the network, high-pass filter in SRM is used to initialize the convolution kernels, which is beneficial to learning steganography noise in the image. Second, in the middle of the network, the residual learning mechanism is used to enhance the convergence speed and stability of the network. Experiments on the standard data set show that the proposed CNN model can detect S-UNIWARD steganography algorithm with high accuracy.

AR1025

Fighting Fake News Using Deep Learning: Pre-trained Word Embeddings and the Embedding Layer Investigated

Mr. Gereme Fantahun Bogale, William Zhu

University of Electronic Science and Technology of China, China

Fake news is progressively becoming a threat to individuals, society, news systems, governments and democracy. The need to fight it is rising accompanied by various researches that showed promising results. Deep learning methods and word embeddings contributed a lot in devising detection mechanisms. However, lack of sufficient datasets and the question “which word embedding best captures content features” have posed challenges to make detection methods adequately accurate. In this work, we prepared a dataset from a scrape of 13 years of continuous data that we believe will narrow the gap. We also proposed a deep learning model for early detection of fake news using convolutional neural networks and long short-term memory networks. We evaluated three pre-trained word embeddings in the context of the fake news problem using different measures. Series of experiments were made on three real world datasets, including ours, using the proposed model. Results showed that the choice of pre-trained embeddings can be arbitrary. However, embeddings purely trained from the fake news dataset and pre-trained embeddings allowed to update showed relatively better performance over static embeddings. High dimensional embeddings showed better results than low dimensional embeddings and this persisted for all the datasets used.

AR1031

Machine Computing Function Designing for Creative Thinking

Prof. Zhu Ping

Tellhow Group Ltd., China

With a case study of humanoid resolving mathematics application problems in primary school, this paper discusses the basic theoretical method of creative thinking. This paper holds that the memory and analogy “teaching and learning” mode is the main way to realize machine intelligence. Through certain granularity knowledge splitting and analogy reorganization, creative thinking can be realized by machine computing. By the design and implementation of the creative thinking exploration IDE, this paper realizes the basic creative thinking process by analogy. Firstly, natural language semantic representing and matching are carried out with scene framework; Secondly, machine analysis of problem resolving is carried out; Then, algorithm is used to simulate the running process of thinking; finally, the main realization challenges of the creative thinking are prospected.

C1004

Soil Moisture Prediction Using Machine Learning Techniques

Ms. Sagarika Paul, Satwinder Singh

Central University of Punjab, India

Although - Soil moisture is the main factor in agricultural production and hydrological cycles, and its prediction is essential for rational use and management of water resources. However, soil moisture involves complicated structural characters and meteorological factors, and is difficult to establish an ideal mathematical model for soil moisture prediction. Prediction of soil moisture in advance will be useful to the farmers in the field of agriculture. In this paper, we have used machine learning techniques such as linear regression, support vector machine regression, PCA, and Naïve Bayes for prediction of soil moisture for a span of 12 to 13 weeks ahead. These techniques have been applied on four different datasets collected from 13 different districts of West Bengal, and four different crops (Potato, Mustard, Paddy, Cauliflower) collected over the span of about 1st January 2020 – 30th March 2020. The performance of the predictor is to be evaluated on the basis of F1-Score.

C1016

Efficient Low-Latency Dynamic Licensing for Deep NeuralNetwork Deployment on Edge Devices

Mr. Toan Van Pham, Ngoc Quang Tran Ngo, Hoang Minh Pham, Tam Minh Nguyen, Thanh Minh Ta

Sun-Asterisk R&D Lab, Vietnam

Along with the rapid development in the field of artificial intelligence (AI), especially deep learning, deep neural network (DNN) applications are becoming more and more popular in reality. To be able to withstand the heavy load from mainstream users, deployment techniques are essential in bringing neural network models from research to production. Among the two popular computing topologies for deploying neural network models in production are cloud-computing and edge-computing. Recent advances in communication technologies, along with the great increase in the number of mobile devices, has made edge-computing gradually become an inevitable trend. In this paper, we propose an architecture to solve deploying and processing deep neural networks on edge-devices by leveraging their synergy with the cloud and the access-control mechanisms of the database. Adopting this architecture allows low-latency DNN model updates on devices. At the same time, with only one model deployed, we can easily make different versions of it by setting access permissions on the model weights. This method allows for dynamic model licensing, which benefits commercial applications.

Session 2: E-commerce and Information Management

AR1002

Research on Intelligent Question Answering System Based on College Enrollment

Prof. Bo Song, Xiao-Mei Li

Shenyang Normal University, China

At present, there are some problems in the way of research and training of primary school teachers, such as high cost, long cycle, limited number of research and training, slow updating of research contents and so on. Therefore, the virtual learning community(VLC) for primary school teachers' research and training is constructed. In the process of implementation community core function, a hybrid recommendation algorithm based on content information label extraction and collaborative filtering is proposed for personalized recommendation system, which solves the problem of cold start of new users. Based on the NLP and the deep-learning algorithms, the two models of interest and behaviour are combined to update the interest model based on the behaviour of the learners in the intelligent teaching system. According to the user evaluation data, the intelligent teaching evaluation system has realized the intelligent evaluation of teachers' teaching activities. The insufficient in problem classification have been improved based on deep-learning algorithms for intelligent question answering system. The solution proposed in this paper has been applied to the research and training of primary school teachers in Liaoning province of China, which will play an important role in improving the level of teachers in primary education.

AR1010

Memory Network based Knowledge Driven Model for Response Generation in Dialog System

Mr. Wansen Wu, Xinmeng Li, Quanjun Yin

National University of Defense Technology, China

Human-machine conversation is one of the most important topics in artificial intelligence (AI) and has received much attention across academia and industry in recent years. Currently dialogue system is still in its infancy, which usually converses passively and utters their words more as a matter of response rather than on their own initiatives, which is different from human-human conversation. This paper tackles the problem of generating informative responses by integrating knowledge base into the dialogue system's response generation process, in an end-to-end way. A novel architecture is proposed, namely Memory network based Knowledge Driven Model (MKDM), which can integrate knowledge base by memory manager, and generate knowledge grounded responses. By conducting comparative experiments on automatic metrics demonstrate the effectiveness and usefulness of our model.

AR1028

CrimeSTC: A Deep Spatial-Temporal-Categorical Network for Citywide Crime Prediction

Ms. Yue Wei, Weichao Liang, Youquan Wang, Jie Cao

Nanjing University of Finance and Economics, China

Crime is one of the most complex social problems around the world, posing a major threat to human life and property. Predicting crime incidents in advance can be a great help in fighting against crime and has drawn continuous attention from both academic and industrial communities. Although a plethora of methods have been proposed over the past decade, most of the algorithms either perform prediction by leveraging linear or other oversimplified models or fail to fully explore the dynamic patterns in the crime data. In this paper, we propose a novel deep learning based crime prediction framework called CrimeSTC to jointly learn the intricate spatialtemporal-categorical correlations hidden inside the crime and big urban data. Specifically, our framework consists of four parts: dynamic module (handling the data that change every day via local CNN and GRU), static module (handling the data that remain the same over time via fully connected layers), categorical module (capturing the categorical dependency via graph convolutional network) and joint training module (concatenating dynamic and static representations to forecast crime numbers). Extensive experiments on real world datasets validate the effectiveness of our framework.

AR1033

Ensemble Methods with Bidirectional Feature Elimination for Prediction and Analysis of Employee Attrition Rate During Covid-19 Pandemic

Mr. Yash Vijay Mate, Atharva Sameer Potdar, Priya RL

Vivekanand Education Society's Institute of Technology (VESIT) , India

In the wake of the COVID-19 pandemic, a myriad of organizations across the globe have decided to churn out some of their work-force owing to the economic recession. According to the International Monetary Fund (IMF), the world has experienced a financial shrinkage of 3% which is the steepest slowdown since the Great Depression in the 1930s. Aviation, Tourism, Travel, and Hospitality are the industrial sectors that have been impacted the worst. Deloitte India's 2020 Workforce and Increment Trends Survey has stated that the involuntary attrition rate for the current financial year is close to 15%. The research conducted aims at analyzing the Attrition of employees based on factors like their Educational Qualifications, Years of Work Experience, Gender, Department, and many others. The proposed system also predicts the Attrition rate of employees using a Machine Learning Pipeline that uses Advanced Ensembling, Gradient Boosting, Feature Selection through Bi-Directional Elimination, and optimizing the hyper-parameters through a Randomized Grid Search Approach. Owing to the optimizations carried out in the entire

Model Building pipeline, the algorithm successfully achieves state-of-the-art performance. To ensure legitimacy in the results, the Stratified K Fold Cross Validation methodology is used for evaluation.

C1013-A

Analysis and Generation of the Narrative Elements in a “Dojoji” Story

Ms. Miku Kawai, Jumpei Ono, Takashi Ogata

Iwate Prefectural University, Japan

‘Konjaku Monogatari’ [1] is one of the “legends of Dojoji.” The legend of Dojoji is a story that has been passed down from ancient times [2]. The process includes picture scrolls, narratives, and songs. Among them, ‘Konjaku Monogatari’ [1] is the second oldest work in the legend of Dojoji. The content of ‘Konjaku Monogatari’ is that two Buddhist monks went on a visit to Kumano. On the way, a young monk is approached by the hostess at a guesthouse where he stayed (this hostess is Kiyohime. The young monk is later named Anchin). The young monk lied to the woman that he would return after his pilgrimage to Kumano. However, the woman spots the lie. And the young monk was burned to death at the Dojoji Temple. After that, the woman and the young monk were released from suffering by the power of the Lotus Sutra. The first half is a lust story. The second half is a liberation story. In this paper, we analyzed the scene composition of ‘Konjaku Monogatari’ [1]. Specifically, we organized each scene. Then, we extracted the components (people, things, places, time, dreams/reality). In this research, first, we analyzed the components of the story. Then, we connected the components to explanations generated. This generation was the goal of this research. The analysis and results of the story are summarized in figure 1 and table 1. Figure 1 shows the flow of the story of ‘Konjaku Monogatari’ [1]. The left boxes explain each scene. And as the arrow progresses, so does the story. On the right boxes are the components of each scene. It is divided into five items: characters, objects, places, times, and dreams/reality. All time periods entered were educated guesses. Therefore, guesses are enclosed in parentheses. Dream/ reality shows whether the scene was a dream or a real scene. Table 1 is a summary of the characters that appear in the constituent elements. Throughout the story, many characters have multiple names. In addition, there were important characters who were frequently represented. The authors have developed the Integrated Narrative Generation System (INGS) [3][4]. The INGS has a conceptual dictionary that systematically stores nouns. A noun concept has attribute information. Attribute information is information that records the characteristics and properties of a noun; the explanation generator in INGS inserts an explanation structure into a story using attribute information [5]. The INGS refers to the information on those attributes.

An old monk and a young monk go to visit Kumano.	Characters: An old man (Monk), A young and good-looking monk	Objects : --. Location: Murogun	Time:--. Dream/Reality: Reality
He rented a house for lodging and he was pressed by a young woman.	Characters: An old man (Monk), A young and good-looking monk, Two or three servants, young widow	Objects : Kimono Location: Murogun	Time: (Night) Dream/Reality: Reality
The young monk lies to the woman that he will return from a pilgrimage. He says that they are going to return to Kumano, but the young woman notices the lie and pursues him.	Characters: An old man (Monk), A young and good-looking monk, A young widow, Monks from Kumano, Servants, A viper	Location: Murogun	Time: --. Dream/Reality: Reality
They are chased by snakes and run away to Dojoji. The young monk is hidden by the bell and burns to death.	Characters: An old man (Monk), A young and good-looking monk, A snake, Monks of Dojoji Temple	Objects : A bell Location: Dojoji Temple	Time:--. Dream/Reality: Reality
In a dream, a large snake appeared and said that it was the young monk. He will ask for relief from suffering with the Lotus Sutra.	Characters: A senior monk, A large snake (Young monk)	Objects: The Lotus Sutra Location:--.	Time: (Night) Dream/Reality: Dream
The old monk chants the Lotus Sutra. The young monk and woman thank him.	Characters: A senior monk, Monks, A monk(Tosotsuten), A woman(Touriten)	Objects : (The power of) The Lotus Sutra Location: Dojoji Temple	Time:--. Dream/Reality: Reality → Dream
The old monk was so moved that he began to revere the power of the Lotus Sutra.	Characters: A senior monk, Persons who has seen or heard something	Objects: (The power of) The Lotus Sutra Location:--.	Time: After some time in the sun. Dream/Reality: Reality

Figure 1. The flow of the story of ‘Konjaku Monogatari’

Table 1. Characters in the “Dojoji” story

Character	Names
(i) Buddhist monk	An old man (with a young monk)
(ii) Buddhist monk	A young and good-looking monk, A large snake, Tosotsuten (Tushita)
(iii) Buddhist monk	A senior monk
(iv) Another Buddhist monk	A monk at Dojoji Temple, A monk from Kumano, Many monks
A woman	A young widow, A poisonous snake, A large snake, Touriten (Trāyastriṃśa)
Two or three servants	Servants
Persons who has seen or heard something	-

REFERENCES

- [1] Kazuo Mabuchi, Fumimaro Kunisaki and Toru Konno. 1919. Konjalkumonogatarisyu vol.1. Shogakukan.
- [2] Miku Kawai, Jumpei Ono and Takashi Ogata. 2020. Analyzing the Stage Performance Structure of Kabukidance “Kyoganoko Musume Dojoji”. In Proceedings of the 34th Annual Conference of the Japan Society of Artificial Intelligence, 3D1-OS-22a-04.
- [3] Takashi Ogata. 2020. Internal and External Narrative Generation Based on Post-Narratology: Emerging Research and Opportunities. GI Global.
- [4] Takashi Ogata. 2020. Toward an Integrated Approach to Narrative Generation: Emerging Research and Opportunities. IGI Global.
- [5] Jumpei Ono, Takuya Ito and Takashi Ogata. 2020. Toward Explanation Generation in a Narrative Generation System. In Proceedings of the 37th Annual Meeting of the Japanese Cognitive Society, P-121."

C1015

Hyperbolic Attributed Network Embedding with Self-adaptive Random Walks

Ms. Bin Wu, Yijia Zhang, Yuxin Wang

Dalian University of Technology, China

Network embedding aims to learn low-dimensional vectors for vertices in complex networks. In real-world systems, nodes in networks are commonly associated with diverse attributes. However, classic approaches generally ignored the implicit relations and hierarchical information introduced by attributes. Motivated by this, we propose a new method named AHANE, short for Adaptive Hyperbolic Attributed Network Embedding, to learn the vertex representations of attributed networks. We perform a biased self-adaptive random walk, generating vertices sequences that can well retain the distribution of vertices in attributed networks. And then propose a novel framework to optimize both the explicit relations (i.e., observed directly connected links between nodes) and implicit relations (i.e., unobserved but transitive links through attributes) by using hyperbolic skip-gram model. We conducted extensive experiments on real datasets related to vertex classification, link prediction and nearest nodes searching. Experimental results on real-world datasets demonstrate the efficiency and effectiveness of AHANE.

C1017

Dynamic Portfolio Management Based on Pair Trading and Deep Reinforcement Learning

Ms. Fucui Xu, Shan Tan

Huazhong University of Science and Technology, China

Existing portfolio management methods have made great progress in diversifying non-systematic risks, but they have ignored systemic risks. In response to this issue, we proposed a dynamic, market-neutral, risk-diversified portfolio management model by combining the ideas of pair trading strategy, deep reinforcement learning with traditional portfolio management model. We conduct an experiment on the Chinese A-share market by selecting 32 pairs of stocks. The experiment results showed that the proposed pair-based deep portfolio model has superiority for dynamic portfolio management problem in trade-off investment returns and risks.

Session 3: Computer and Intelligent Control System

AR1026

Intelligent Control System of Optimal Oil Manufacturing Production

Mr. Mohamed Yassine Hanafi

Peter the Great St. Petersburg Polytechnic University, Russia

In the article, we analyze the optimality of an oil production manufacturing via intelligent control digital twins. By examining the process industry, we present the primary keys of oil production lines, productivity, and quality. To spotlight on the intelligent process control system, as well as on the adaptive intelligent optimization of the production process, we used several methods, namely: Multi-Criteria Decision Analysis, Pareto optimization method and approximate neural network integration of all production line process information; in addition to tracking analysis, productivity and quality control. Even though this article discusses the optimality of oil manufacturing, the conclusions determine in this article can be extended to the processing industry worldwide.

C1014-A

Programmed Narrative Units Using the Verb Conceptual Dictionary of an Integrated Narrative Generation System

Mr. Takuya Ito, Jumpei Ono, Takashi Ogata

Iwate Prefectural University, Japan

In this research, one programmed story is called Programmed Narrative Unit (PNU). PNU provides knowledge of events and constituent elements for story generation. We developed PNUs using the "type of folktale" [1], which is an outline of Japanese folktales recorded in "Nihon Mukashibanshi Taisei (The Concluded Compilation of Japanese Folktales)" [2]. There are 827 types of folktales and, each type is based on common points in folktales, such as characters, objects, and events. The prototype PNUs can generate only one kind of story. However, PNUs can generate various stories by linking it with the knowledge system about verbs and nouns.

Integrated Narrative Generation System (INGGS) [3] is a system for automatically generating Narratives. The INGS has conceptual dictionaries, which are used for generating events in narratives. The noun conceptual dictionary has about 110,000 noun concepts that systematically registered. The verb conceptual dictionary has about 10,000 verb concepts that systematically registered. In generating an event in INGS, a case structure of an event is generated using conceptual dictionaries. Moreover, the sentence generation module in the INGS generates a sentence based on the case structure of the event.

PNU was created by referring to the case structure of verb concepts, but PNU does not correspond to conceptual dictionaries. In this paper, we describe making PNUs based on conceptual dictionaries. Figure 1 shows a making method of PNUs using INGS's concept dictionaries and "types of folktale." This method is divided into two steps: (1)

making prototype PNUs based on the "types of folktale," and (2) corresponding PNUs to conceptual dictionaries. We completed Step (1) [1]. The step (2) replaces words in PNUs with concepts in conceptual dictionaries. This paper focuses on the verb concept dictionary in Step (2).

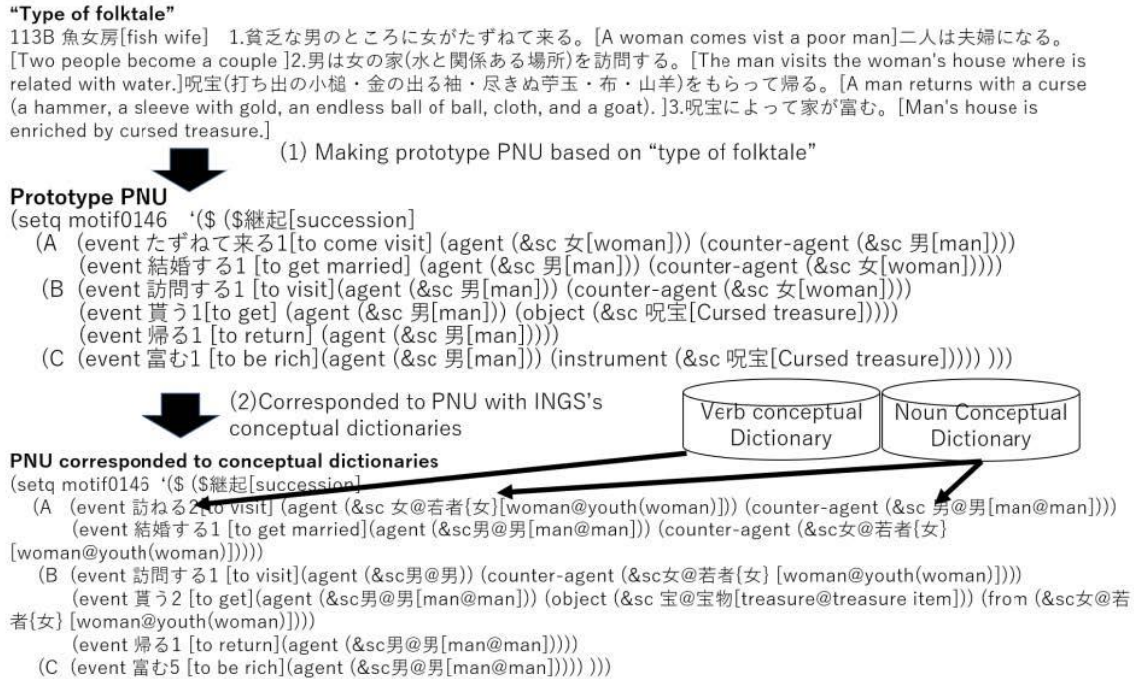


Figure1: Creation flow of PNUs using "types of folktale" and conceptual dictionaries

The correspondence procedure between PNUs and verb concepts is as follows.

1. Search verb concepts: Search for a verb concept that has the same meaning as the verb in the PNU. The verb concept is registered individually when a specific verb has multiple meanings, and each definition can be confirmed by the case information and sentence pattern used.
2. Case unification: Cases that were included in PNUs are revised based on cases of verb concepts. However, insufficient cases were added to the PNU's case set, and extra cases were deleted in the PNUs.

PNUs include verbs that do not correspond to verb concepts. Therefore, we should add some new verb concepts to the verb conceptual dictionary.

We linked PNUs based on the "type of folktale" to the verb conceptual dictionary into the INGS. In the future, we will perform story generation using PNUs and a generation mechanism of the INGS.

REFERENCES

[1] Ito, T., Ono, J. & Ogata, T. (2018) Using Motifs of Folktales for Narrative Generation. in Proc. of the 59th Special Interest Group on Language Sense Processing Engineering, pp. 8-11. (SMC2018 Workshop on Informational and Cultural Narratology and Cognitive Content Generation.).

[2] K. Seki. 1979 "Nihon Mukashibanashi Taisei [The Concluded Compilation of Folktales]," Kadokawa.

[3] Ogata, T. 2019. Toward a post-narratology or the narratology of narrative generation. In T. Ogata & T. Akimoto (Eds.), Post-narratology through computational and cognitive approaches, pp. 85-142 .

C1003

Iterative Learning Control of Functional Electrical Stimulation Based on Joint Muscle Model

Jiaming Zhang, Lin Zhang, Shaocong Gu, Min Li, Wei Meng, Prof. Qingsong Ai, Quan Liu

Wuhan University of Technology, China

Functional electrical stimulation (FES) is an effective treatment for the rehabilitation of stroke patients with hemiplegia. At present, it is challenging to accurately control the functional electrical stimulation during rehabilitation as various parameters of electrical stimulation are difficult to determine, and the stimulation response is easily affected by interferences. To improve the control accuracy for trajectory tracking during repetitive training and to compensate external interference, in this paper we take the knee joint as an example designed a functional electrical stimulation system based on adaptive network-based fuzzy inference system (ANFIS) and iterative learning control (ILC). Firstly, an adaptive fuzzy neural inference system was used to establish the joint muscle model, and a PID-type iterative learning controller was used to achieve the adjustment of functional electrical stimulation parameters. The maximum error of the ANFIS-based muscle model was 1.64Nm and the root means square error was 0.4327Nm. The maximum angle error of the actual knee motion compared with the expected angle was 22.76°, and the root means square error was 6.7413° after 10 iterations. Therefore, the system realizes the control of the pulse width of functional electrical stimulation in rehabilitation training, so that patients can carry out rehabilitation training according to the expected trajectory, which provides convenience for the rehabilitation training of stroke hemiplegia patients.

C1007

A Reinforcement Learning-Based Classification Symbiont Agent for Dynamic Difficulty Balancing

Mr. Siphesihle Philezwini Sithungu, Prof. Elizabeth Marie Ehlers

University of Johannesburg, South Africa

AdaptiveSGA is a mechanism for achieving Adaptive Game AI-based Dynamic Difficulty Balancing in games. AdaptiveSGA is based on the Symbiotic Game Agent model and, therefore, leverages the advantages of biological symbiosis. Within the AdaptiveSGA architecture, the classification symbiont agent is responsible for the dynamic difficulty balancing component. Current work proposes the use of a classification symbiont agent that makes use of reinforcement learning to optimise dynamic difficulty balancing in order to match the opponent's skill. Current work also introduces three different types of decision-making algorithms that can be used by decision-making symbiont agents to display different kinds of behaviour. The ability to reproduce different kinds of NPC behaviour forms the adaptive game AI component of AdaptiveSGA. Experimental results showed that the reinforcement learning-based classification symbiont agent can achieve an even game with opponents and can further help minimise the number of draws.

C1012-A

Implementation of an Explanation Generation Mechanism Using Attribute Frames and a Noun Conceptual Dictionary

Dr. Jumpei Ono, Miku Kawai, Takashi Ogata

Aomori University, Japan

In this work, we propose a method of explanation generation using the information about characters in a story, and a method of inserting explanations as a basis for explanation. We introduce a mechanism of explanation generation implemented in Common Lisp. Explanations in stories can range from simple (merely informative) to complex (or rhetorical). In this paper, we present a synthesis of the mechanisms we have attempted to generate explanations with

from two angles. The first is a simple description that provides basic details about the characters, places, and things that appear in the story [1]. The other is the generation of skepticism as a form of explanatory overload [2]. The function of integration here serves as a foundation for examining advanced explanations of various species in terms of narrative generation. In the last part, we discuss advanced explanatory techniques, the diversity of explanatory expressions, and systems of explanation.

The explanation generator takes as input a story generated by an Integrated Narrative Generation System [3][4], which is represented by a tree of events called a story tree. The story tree consists of a case structure describing the events that make up the story, and the explanation generator adds an explanation structure to the case structure of the events, which embodies the explanation's content. The explanation generator extracts the target element from the case structure of the event to which the explanation is to be added, refers to the instance data about the element, and adds the information to it as the structure of the explanation. Due to using the explanation generator, a narrative discourse tree with additional explanatory structure is output to the story tree.

Attribute information is stored in the conceptual dictionary, but no concrete values are entered for items such as name and height. When a state is created in the story generation, the attribute information as a framework is referenced from the conceptual dictionary, and each blank entry is filled in with a concrete value (e.g., Taro if it is a name). As a result, concrete elements from the story are inserted into the case structure. This concrete element is called an instance. Figure 1 shows an example of attribute information.

```
((ID age%安珍#1[age%Anchin#1]) (instance-of 僧@僧[Monk@Monk]) (type nil) (location nil) (名前[Name] 安珍[Anchin])
(身長[Height] nil) (体重[Weight] nil) (年齢[Years-old] nil) (外見[Appearance] 若い[Young]) (所属集団[] nil) (服[Cloth] nil) (所
持[Belongings] nil) (状態[State] 健康[Good health]) (健康状態[Health barometer] 100) (体勢[posture] nil) (職業[Works] 僧
[Monk]) (行動目的[Purpose] nil) ((住所[Adress] nil) (言葉[Language] 日本語[Japanese]) (意識[Consciousness] 覚醒
[Awakening]) (位置[Position] nil))
```

Figure 1: An example of an attribute frame

The word *unchiku* refers to deeply accumulated knowledge, and “to devote the whole of one’s profound knowledge to it” indicates the manner in which the accumulated knowledge is poured into work with all of one’s might. On the other hand, phrases such as “professing one’s profound knowledge” or “showing off one’s profound knowledge” are also widely used, referring to the act of sharing one’s knowledge in an unwanted situation. In a story, apart from the narration of events, there is a rhetoric that halts the story’s progress, and describes the characteristics of an arbitrary matter in the story. In Genette’s theory of narrative discourse [3], this rhetorical technique is called the pause method. The act of the characters in the story, when they reveal their profound knowledge, involves explaining about a subject in depth; it is a method of suspension.

In this paper, we propose a method of explanation generation based on the attribute information of the instances in the story, and a strategy of inserting the explanation as the foundation of explanation. The explanation generation mechanism presented in this paper is a framework that provides a formal approach for explanation generation. Hence, the future goal is to investigate more tactical techniques to enable us to manipulate the impressions of the narrative that is generated.

REFERENCES

- [1] Jumpei Ono, Takuya Ito and Takashi Ogata. 2020. Toward Explanation Generation in a Narrative Generation System. In Proceedings of the 37th Annual Meeting of the Japanese Cognitive Society, P-121.
- [2] Kazui Fukuda, Jumpei Ono and Takashi Ogata. 2020. Introducing an Extensive Knowledge Generation Mechanism into a Narrative Generation System. In Proceedings of the 34th Annual Conference of the Japan Society of Artificial Intelligence, 3D1-OS-22a-03.

-
- [3] Takashi Ogata. 2020. Internal and External Narrative Generation Based on Post-Narratology: Emerging Research and Opportunities. GI Global.
- [4] Takashi Ogata. 2020. Toward an Integrated Approach to Narrative Generation: Emerging Research and Opportunities. IGI Global.
- [5] Gérard Genette. 1972. Narrative discourse: An essay in method (J. E. Lewin, Trans.). Cornell University Press.

C1001

Improved Rehabilitation Robot Trajectory Regeneration by Learning from the Healthy Ankle Demonstration

Yunkai Wang, Prof. Qingsong Ai, Ling Ai, Quan Liu, Jiwei Hu, Zude Zhou

Wuhan University of Technology, China

The prevalence of ankle injuries in daily life has prompted the widespread application of rehabilitation robots. One of the important factors affecting robot-assisted ankle rehabilitation is the training trajectory which is usually regenerated from ankle movements. The traditional trajectory regeneration method is not suitable for the clinically recommended periodic ankle movements. In this paper, an improved robot trajectory regeneration method based on the individual characteristics is proposed to provide training reference trajectory for rehabilitation robots. This method extracts sample characteristics from the demonstration of the healthy ankle and reconstructs the sample space. Based on Learning from Demonstration (LfD) technology, the reference trajectory is regenerated for the rehabilitation of the injured ankle. The analysis of statistics and the regeneration of spatial features are performed to prove that this proposed method can regenerate the rehabilitation reference trajectory by learning from the healthy ankle demonstration.

Session 4: Artificial Intelligence and Image Processing

AR1011

A Novel Method for Satellite Monitoring with One-dimension Feature Based on Autoencoder Model

Dr. Hu Di

China Academy of Space, China

In order to monitor all telemetry data, thresholds are adopted to judge the status of satellite. This method is terrible when some abnormal happened, if the data was not more than pre-set threshold. when the data exceeding the threshold after a period of time, there were a big fault for satellite. This fault would make a huge economic loss especially for the communicate satellite. These are two classes telemetry of satellite about this scenario, one class is continuously changing digital telemetry, the other class is temperature. A method was proposed for solving these problems. An autoencoder model was applied to monitor the telemetry data according to the devices or equipment board. Each device or equipment board has own model, and telemetry data is inputted to the model for compressing a single parameter as one-dimension feature. The operators just only monitor the one-dimension feature, that is simple and fast. If an abnormal appear, the parameter of device or equipment board would be changed to warn the operators, who would check the actual telemetry data of device or equipment board, and the abnormal would be checked out immediately and earlier than the traditional method. For detecting the two kinds of typical abnormal which could not detect by traditional method, two models were built and data was prepared. The results show that auto-decoder model can detect the abnormal accurately and be useful for the operator. A software was built, and some models were trained for a satellite.

AR1027

Omnidirectional Robot Indoor Localisation Using Two Pixy Cameras and Artificial Colour Code Signature Beacons

Dr. Zeyad Al-Shibaany, Mohanad Nihad Noaman, Saba Al-Wais

Cardiff University, UK

Location estimation of Autonomous mobile robots is an essential and challenging task, especially for indoor applications. Despite the many solutions and algorithms that have been suggested in the literature to provide a precise localisation technique for mobile robots, it continues to be an open research problem and worth further study. In this paper, a predefined map with artificial colour code signature (CCs) beacons are used to build an effective algorithm to achieve an indoor localisation and position prediction of an omnidirectional mobile robot. This algorithm is primarily based on calculating the distance between the robot and the beacon using Pixy cameras, as vision sensors; then, estimating the position of the robot using a trilateration method. By comparing the results obtained in this paper with the mathematically obtained results, it is clearly shown that the robot effectively follows the localisation algorithm to estimate its pose (position and orientation), improving its localisation abilities in addition to obtaining its initial position. Furthermore, the limitations associated with using Pixy cameras are discussed in this paper as well.

C1005

Detecting, Contextualizing and Computing Basic Mathematical Equations from Noisy Images Using Machine Learning

Mr. Daniel Ogwok, Elizabeth Marie Ehlers

University of Johannesburg, South Africa

Various machine learning architectures including neural networks have been designed, developed and used to classify data. These networks have been used for Computer Vision, Speech Recognition and Natural Language Processing, to mention but a few and provide near accurate results. One of the major challenges faced in the area of mathematical equational recognition has been background information and noise. This paper presents a system that makes use of image processing and an artificial neural network to recognize, contextualize and compute mathematical equations from noisy images. The system attempts to overcome the challenges faced at segmentation and recognition stages.

C1010

Automatic Identification of Braille Blocks by Neural Network Using Multi-channel Pressure Sensor Array

Yudai Murakami, Haruko Masuda, Prof. Koichi kuzume

National Institute of Technology, Yuge College, Japan

In recent years, the number of visually impaired people in Japan has exceeded 300,000 including those with low vision, and accidental falls on the station platform involving them have not been eliminated. Persons having acquired visual impairment make up one third of all cases of blindness in Japan. It is known that they often cannot walk alone with only a white cane or guide dog. The main cause of platform accidents was misidentification of braille blocks. Therefore, it was necessary to develop an auxiliary device for accurately identifying braille blocks that the acquired visually impaired could also use easily. In this research, we developed an automatic identification system for braille

blocks using foot pressure data acquired by a multi-channel pressure sensor array. First, we devised a new foot pressure data acquisition device using a multi-channel pressure sensor array. Our proposed device had excellent features such as being light weight, low cost, and easy to extend to multi-channel. Second, in order to accurately identify the braille blocks, the foot pressure data acquired under various conditions was learned by neural network, and identification performance evaluated. As a result of the experiment, the braille blocks could be identified with a high rate of at least 98% accuracy by neural network, with a very simple structure of an input layer (16 neurons), a hidden layer (5 neurons), and an output layer (4 neurons).

AR1014

Part-Based Pedestrian Attribute Analysis

Assis. Prof. Xue Chen, Jianwen Cao

Chinese Academy of Sciences, China

Visual pedestrian attributes are very important for person re-identification. Due to the difficulties in obtaining identifiable face and body shots in surveillance scenarios, clothing appearance attributes become the main cue for identification. In this paper, we propose a part-based pedestrian attribute analysis method upon clothing appearance. First, to alleviate pose misalignment, 25 anatomical key-points are located by OpenPose algorithm and then 9 body parts are extracted. Besides, 3 poses are recognized via constraints on key-points. Second, for each part image, the main color feature is extracted by ColorName algorithm, and the texture classification feature is extracted by CNN network combined with SVM model. Finally, for pedestrian pair with certain poses, a weighted similarity fusion algorithm based on the color and texture feature is applied to compute the total similarity of two sets of body parts. Experimental results on pedestrians in surveillance videos demonstrate the effectiveness of our method.

C1008

Cheat Detection in a Multiplayer First-Person Shooter Using Artificial Intelligence Tools

Mr. Ruan Spijkerman, Elizabeth Marie Ehlers

University of Johannesburg, South Africa

The use of cheating software in video games to gain an unfair advantage has required the use of anti-cheat software and deterrents such as account bans. Anti-cheat software is, however, always a step behind the opposition and as such new and innovative solutions are required. This paper considers AI driven tools as one such approach and compared decision trees, SVMs and Naïve Bayes classifiers in an attempt to classify cheating and honest player behaviour. The results of the research highlighted the potential for mouse dynamics as a measure of player behaviour, and decision trees as the most accurate detector of honest player behaviour.

CA11001

Learning Symbolic Action Definitions from Unlabelled Image Pairs

Ms. Helen Harman, Pieter Simoens

Ghent University - imec, Belgium

Task planners and goal recognisers often require symbolic models of an agent's behaviour. These models are usually manually developed, which can be a time consuming and error prone process. Therefore, our work transforms unlabelled pairs of images, showing the state before and after an action has been executed, into reusable action

definitions. Each action definition consist of a set of parameters, effects and preconditions. To evaluate these action definitions, states were generated and a task planner invoked. Problems with large state spaces were solved using the action definitions learnt from smaller state spaces. On average, the task plans contained 5.46 actions and planning took 0.06 seconds. Moreover, when 20 % of transitions were missing, our approach generated the correct number of objects, action definitions and plans 70 % of the time.

Session 5: Machine Learning and Neural Network II

CA1006

10K LOGO DATASET FOR MACHINE LEARNING LOGO RETRIEVAL PURPOSES

Mrs. Fatema Bader Jasem, Khalid Alzamel

Kuwait University, Kuwait

Trademarks and logos are used worldwide to represent companies, malls, shops and restaurants. It is one of the first visual symbols a company creates in the early stages of planning for this business. The logo must be unique and captures the idea of that business to make it easier for the common people to figure out what this business is about from the logo. With logos and trademarks details are very important where every element in the logo would make a difference including the colours used, shapes and fonts. Many efforts were made in last few years to detect, recognize or match similarities between logos; Moreover one of the major challenges faced was finding the correct dataset that include different local and international clear logos to test on . Thus, this paper presents a new dataset that would help in these types of machine learning project which provides 10K logo images with 2000 unique logo.

CA1007

A Method for Improving Unsupervised Intent Detection Using Bi-LSTM CNN Cross Attention Mechanism

Dr. Hamid Reza Sadeghi, Saeed Shiry Ghidary, Benhur Bakhtiari Bastaki

Mirkabir University of Technology, Iran

Spoken Language Understanding (SLU) can be considered the most important sub -system in a goal-oriented dialogue system. SLU consists of User Intent Detection (UID) and Slot Filling (SF) modules. The accuracy of these modules is highly dependent on the collected data. On the other hand, labeling operation is a tedious task due to the large number of labels required. In this paper, intent labeling for two datasets is performed using an unsupervised learning method. In traditional methods of extracting features from text, the feature space that is obtained is very large, therefore we implemented a novel architecture of auto-encoder neural networks that is based on the attention mechanism to extract small and efficient feature space. This architecture which is called Bi-LSTM CNN Cross Attention Mechanism (BCCAM), crosswise applies the attention mechanism from Convolutional Neural Network (CNN) layer to Bi-LSTM layer and vice versa. Then, after finding a bottleneck on this auto-encoder network, the desired features are extracted from it. Once the features are extracted, then we cluster each sentence corresponding to its feature space using different clustering algorithms, including K-means, DEC, Agglomerative, OPTICS and Gaussian mixture model. In order to evaluate the performance of the model, two datasets are used, including ATIS and SNIPS. After executing various algorithms over the extracted feature space, the best obtained accuracy and NMI for ATIS dataset are 86.5 and 91.6, respectively, and for SNIPS dataset are 49.9 and 43.0, respectively.

CA1014

A Comparative Study of Parkinson Disease Diagnosis in Machine Learning

Dr. Mohammed Younis Thanoun, Mohammad Tariq Yaseen

University of Mosul, Iraq

Parkinson's disease (PD) is a cumulative disorder in the nervous system. PD patients may experience difficulty in movement and speaking due to damages in certain parts in the brain. In this study, we propose using two types of Ensemble learning methods Stacking Classifier and voting classifier, which are potential methods of PD detection using machine learning. Then, we compared between the results of both of them. Stacking Classifier method outperformed voting classifier and the obtained accuracy was 92.2% and 83.57%, respectively. This comparative study would help come out with higher detection accuracy for medical applications such as this chronic disease.

CA1017

Application of Artificial Neural Network for Daily Evaporation Forecasting Using Weather Data

Mr. Hantian Liu

Beijing University of Technology, China

Estimating evaporation is one of the most important works for meteorologists and hydrologists. This paper employed three artificial neural network (ANN) algorithms, which are linear regression (LR), multi-layer perceptron (MLP) and general regression neural network (GRNN), to investigate the possibility to apply ANNs in forecasting evaporation level. The data used in this study are observed values of meteorological variables from a weather observatory in Beijing. Temperature, air pressure and wind speed are three factors affect the level of evaporation most. The study also employed k-fold cross-validation technique to avoid overfitting and improve the performance of the models. Mean absolute error (MAE), root mean square error (MASE) and coefficient of determination (R²) statistics are used to evaluate the performance of the models and the performance of MLP is roughly same as GRNN, which is higher than LR. The result shows that ANN is a kind of accurate and reliable methods to predict evaporation.

CA2011

CnnSound: Convolutional Neural Networks for the Classification of Environmental Sounds

Assist. Prof. Özkan İNİK, Huseyin Seker

Tokat Gaziosmanpasa University, Turkey

The classification of environmental sounds (ESC) has been increasingly studied in recent years. The main reason is that environmental sounds are part of our daily life, and associating them with our environment that we live in is important in several aspects as ESC is used in areas such as managing smart cities, determining location from environmental sounds, surveillance systems, machine hearing, environment monitoring. The ESC is however more difficult than other sounds because there are too many parameters that generate background noise in the ESC, which makes the sound more difficult to model and classify. The main aim of this study is therefore to develop more robust convolution neural networks architecture (CNN). For this purpose, 150 different CNN-based models were designed by changing the number of layers and values of their tuning parameters used in the layers. In order to test the accuracy of the models, the Urbansound8k environmental sound database was used. The sounds in this data set were first converted into an image format of 32x32x3. The proposed CNN model has yielded an accuracy of as much as 82.5% being higher than its classical counterpart. As there was not that much fine-tuning, the obtained accuracy

has been found to be better and satisfactory compared to other studies on the Urbansound8k when both accuracy and computational complexity are considered. The results also suggest further improvement possible due to low complexity of the proposed CNN architecture and its applicability in real-world settings.

Session 6: Education and Learning

CA2006

Transitioning from Traditional Learning to Blended Learning at Some Public Universities in Vietnam after the Covid-19 Pandemic

Hien Thi Thu Dao, Ms. Thu Le Thi Kim

FPT University, Vietnam

The Covid-19 pandemic has addressed critical impacts leading to the nationwide social distancing measures in Vietnam. School closures were mandated by the Government in an attempt to control the transmission of the virus. Online teaching and learning was then temporarily adopted to ensure students' continuous learning. However, the effectiveness of this method was far from expectation. Students showed their reluctance to engage in the virtual learning environment. In the meantime, they shared their negative feedback on the traditional teaching and learning method. As a result, lecturers desired to have a more effective approach conducted after the pandemic. Therefore, this study was carried out to investigate the feasibility of blended learning implementation at some public universities in Vietnam. The results revealed positive feedback from both students and teachers.

CA2002

The Current Situation of Senior High School Students Learning Mathematics with Online Problem-Solving Searching Software

Ms. Xintong Yang

Northeastern University at Qinhuangdao, China

With the rapid development of internet technology, more and more senior high school students try to solve math problems by using online problem-solving searching software (OPSSS) at present. This study explores the situation of mathematics learning of the senior high school student who uses OPSSS and draws the following conclusions: the aim of most students to use OPSSS is to complete assignments as soon as possible; most students use OPSSS usually when they do not understand the problem, have no problem-solving ideas, or meet complicated problem-solving process. Most of them can rethink and summary the method or process of problem-solving after using OPSSS and can solve related mathematics problems smoothly, however, most of them can not keep related knowledge for a long time. Therefore, it is suggested that teachers should give students more guide on how to apply the OPSSS reasonably and be strict with their way and the method to use OPSSS. To the students, they should try to combine the traditional methods of learning mathematics in the process of using the OPSSS, and do not rely too much on OPSSS.

CA2007

The Importance of Soft Skills for University Students in 21st Century

Ms. Anh Pham Thi Van, Hien Thi Thu Dao

FPT University, Vietnam

The world of employment has changed enormously together with the rise of globalization causing employability to become one of the main goals for education systems. Today's employers require employees to have soft skills in addition to technical skills. Therefore, this study was conducted to gain clear perceptions of four populations including students, teachers, employees and employers of the importance of soft skills at work. The results revealed that most of the participants emphasized the necessity of good soft skills. According to the employers, it is advisable to possess advanced soft skills in order to work effectively and productively. However, some of them expressed their disappointment to the employees who owned great technical skills but lacking of basic soft skills to adapt to a new working environment and company culture as well as to solve the problems arising at work. This issue is supposed to be closely correlated with the lack of soft skills training at university. Consequently, an obvious implication to universities in general and public universities in particular was grasped. It is important for higher education institutions to be aware of the need for soft skills for today's workplace so that they can provide essential soft skills training courses for their students.

CA2012

Design of Deep Learning Experiment Teaching Case Based on EMG Signal Analysis

Li Huiyong, Mr. Zhang Yifan, Wang Yiting

Beihang University, China

Against the background of new engineer, universities pay more and more attention to the cultivation of innovative talents with cross-disciplines. The artificial intelligence-related courses are typical interdisciplinary and strong practical courses, and experimental teaching is always an important part of it. In this paper, a case of deep learning experiment teaching based on electromyography signal feature extraction is designed for the intersection of disciplines. This case combines biological information and artificial intelligence technology, including data set construction, network model construction and training, biological information feature classification recognition and other experimental content. By studying this paper, students can not only understand the characteristics and applications of biological information, but also understand and master the basic methods and model construction process of using deep learning technology to process biological information. It has important reference value for training and improving students' ability to analyze and solve problems across disciplines.

Session 7: Information Theory and Technology

CA1001

The Application of Machine Learning in Activity Recognition with Healthy Older People Using a Batteryless Wearable Sensor

Mr. Zitong Zhou

Nanjing University of Chinese Medicine, China

The development of human activity monitoring has allowed for simulation and prediction in a variety of application scenarios. The battery-free wearable sensor is performed on sternum level clothing, mainly by script execution. It is essential to monitor human health, sleep, etc. With the increasing population in the world, the aging population is also becoming larger and larger. Hospitals and nursing homes are in great need to prevent injuries such as older people falling indoors. Existing methods construct the wireless wearable human body multi-physiological parameter monitoring system with wireless sensor network and central monitoring module unit. However, this system has a high false alarm rate and low accuracy in predicting human activities. To solve this problem, we constructed an

activity detection method based on several machine learning algorithms, including Decision Tree, Gradient Boosting Decision Tree (GBDT), Adaboosting, Bagging and Random Forest. Although the decision tree is quite intuitionistic, ensemble learning models can improve the accuracy of prediction significantly by combining a lot of decision trees. By comparing the errors of each model, the most suitable monitoring model for predicting the physiological events of the elderly was selected. It is found that Random Forest outperforms the other methods, and achieves 99.97% on the training data and 98.8% accuracy on testing data, respectively.

CA1010

Comparison of LSTM, GRU and Hybrid Architectures for Usage of Deep Learning on Recommendation Systems

Mr. Mario Leandro Pires Toledo, Marcelo Novaes de Rezende

Instituto de Pesquisas Tecnológicas do Estado de São Paulo, Brazil

This article shows the results of a performance analysis from LSTM, GRU and Hybrid Neural Network architectures in Recommendation Systems. To this end, prototypes of the networks were built to be trained using data from the user's browsing history of a streaming website in China. The results were evaluated using the metrics of Accuracy, Precision, Recall and F1-Score, thus identifying the advantages and disadvantages of each architecture in different approaches.

CA1011

Using Multi-Agent Microservices for a Better Dynamic Composition of Semantic Web services

Ms. Zouad Sara, Boufaida Mahmoud

Larbi Ben Mhidi University, Algeria; LIRE Laboratory Abdelhamid Mehri – Constantine 2 University, Algeria

The development of new technologies and recent paradigms should be explored to support interoperability in the medium and longer-term. This paper examines the integration of micro-services and multi-agent systems (MAS), implementing a new paradigm called Multi-Agent Microservices (MAMS) for the dynamic composition of Semantic Web services. The objective is to improve agility in the development of the system and to facilitate the deployment of Multi-Agent Systems (MAS) within microservices. This approach uses a "dynamic" composition and must consider the optimization of the QoS (Quality of Service), the satisfaction of the user's global constraints, and the preservation of the semantic coherence of the data flow exchanged between the different composite services. To validate the proposed approach, we give an example applied on tourism.

CA1013

Increase the System Utilization by Adaptive Queue Management System with Time Restricted Reservation

Mr. Varis Limlawan, PORNTHEP ANUSSORNITISARN

Kasetsart University, Thailand

Traditionally, the ticket queue technology is implemented to manage queuing system, but the disadvantage of the ticket queue is losing queue information. The queue-length and the waiting time is often overestimated when some customer abandons from the queue. The overestimated waiting time intensify the customer abandonment problem which has negatively effects on business revenue and the resource utilization. Based on the problem, this paper aims to study the adaptive queue management system with the queue reservation system and also proposed the time restriction rule for the reservation. In the system the queue information such as queue-length and service time is

constantly updated by Artificial Intelligence (A.I.), and the system is allowed customer to reserve the queue if the waiting time is too long. Moreover, the time restriction rule prevents the reservation which affects the system performance. The result shows that the adaptive queue management system with the queue reservation and the time restriction rule outperforms the system without the time restriction rule. In most cases, the resource utilization of the system is 0.9, and the percentage of customer completed service is improved by the time restriction rule.

CA1015

DF-map: A Novel Variable Resolution Decision Forest Map for Localization

Mr. Shizhen Li, Tao Wu, Li Wang, Zhiyu Wan

National University of Defense Technology, China

Localization is one of the most important tasks for self-driving vehicles. Existing localization methods usually rely on satellite signals or high-precision maps. However, the former is often limited by signal shielding, while the latter requires higher computing resources and storage. To overcome these shortcomings, we present a novel localization approach called decision-forest-map (DF-map), which constructs decision trees of various features extracted from the collected data. DF-map can represent the environment with variable resolutions. The resolutions are related to the similarity of the features of input data and the features of the environment. The decision trees of DF-map can output different ranges of localization according to different resolutions. Then the final localization is got by fusing the ranges. Compared with the commonly used localization methods based on high-precision map, DF-map is easier to construct and maintain. It does not need satellite signals, too much computing resources, and storage requirements. Besides, DF-map is a flexible framework that can use different features according to the specific environment and sensors. To verify the effectiveness of our approach, we constructed a Lidar-based DF-map for an off-road environment with a road length of about 1000m. The storage of the map is only about 50M, and the average localization accuracy of the best result is about 1.2m.

Session 8: Data Analysis and System Engineering

R004

Analysis of Measure Fluctuation Based on Adtributor Algorithm

Mr. Zhao Yanjie, Duan Xiaochen, Kang Lin

iQIYI, China

In order to be able to quickly and easily discover the root-cause of data when fluctuation occurs, this paper introduces an Adtributor algorithm based on the explanatory power and surprise value, and it is selected from the forecast value compared with, the calculation of non-mutually exclusive dimension and the selection of algorithm threshold three aspects to optimize Adtributor algorithm. Through two comparative experiments, it's proved that the calculation of non-mutually exclusive dimensions uses the sum of the measure corresponding to each element and the algorithm threshold compute by the cardinality of dimensions. Finally, the practical application of Adtributor algorithm in data platform is introduced.

R005

Research on Data Security Protection Method Based on Improved K-means Clustering Algorithm

Ms. Jinghui Cai, Dashun Liao, Jianqiu Chen, Xue Chen, Tingting Liu, Jialin Xi

Jinan University, China

Data security is a severe challenges in the era of Internet. The traditional K-means clustering algorithm can protect the data security properly when it is applied in the field of information security, but the accuracy and availability of its clustering process are difficult to meet the needs of reality. In order to effectively achieve the high availability and accuracy of clustering algorithm, aiming at the shortcomings of traditional K-means algorithm, this paper studies the improvement of K-means clustering algorithm based on differential privacy protection. The core theory of K-modes is used to select the initial point of clustering, and the shortest distance from the current point to the original cluster center point is found by using Euclidean distance, so as to get the cluster again. The differential privacy protection technology is introduced and improved based on Laplace mechanism. By calculating the distance between the data sample and the center point, the specific location of sensitive attributes in the data sample is obtained, so as to change the order of adding noise and obtain more accurate clustering results. The experimental results show that compared with other data security protection algorithms, the algorithm proposed in this paper has obvious advantages in clustering effect, clustering accuracy and time complexity.

R020

Research on EDP Migration Policy Based on BP Neural Network and Cellular Automata Model

Ms. Zhe Zhang, Xingjian Yuan

China Agricultural University, China

In recent years, massive greenhouse gas emissions have exacerbated the rise in global sea levels. Global warming, melting glaciers and other gradual slow-onset climate risks have caused the phenomenon of a progressive ecological environment deterioration. Large-scale migration activities originating from environmental and climatic factors have attracted outside attention. Some island nations, such as Maldives, Tuvalu, Kiribati, and the Marshall Islands are at risk of disappearing completely due to their geographical location, and the island's population is facing homelessness.

A recent UN ruling suggests that these people displaced by environmental changes (EDP) may qualify as refugees and that certain policies are needed to complete the task of EDPs' migration. However, these EDPs may lose their unique culture, language and lifestyle during the process of relocation and resettlement, and the cultural heritage passed down through the ages is also at risk of dying out. Cultural heritage is a reflection of the uniqueness and originality of a region, and the spiritual capital and pillar of a country. Therefore, we must study the issue of EDPs' migration and formulate a policy that can properly house EDPs and effectively protect the culture of the island nations for better global development.

R021

Data Association Rules Mining Method Based on Improved Apriori Algorithm

Mr. Haotong Wu

University of California San Diego, USA

In the existing data mining technology, there are some shortcomings in association rule mining methods. In this paper, aiming at the problem that the mining efficiency of Apriori algorithm is not high when dealing with large database, the genetic algorithm is introduced to improve the Apriori algorithm. This paper first introduces the basic concept and principle of association rules, describes the basic idea of Apriori algorithm in detail, and an improved

algorithm based on Partition algorithm is proposed for its shortcomings. Then introducing the principle and operation flow of genetic algorithm in detail, and puts forward the corresponding improvement solutions for the coding scheme and fitness function. Finally, the association rule mining is established by combining genetic algorithm with Apriori algorithm. Compared with other methods, the experimental results show that the proposed method has better performance, higher mining efficiency and better data mining.

R1002

Design of Dial-type Spectrum Visualization System

Mr. Guo Fengyue, Jingchang Pan, Cao Zhi

Shandong University, China

The analysis of stellar spectrogram is an important subject in astronomy nowadays. Many astronomical researches need to analyze, mine and extract information from stellar spectrogram to obtain the physical parameters of celestial bodies. Different from previous stellar spectrogram plotting, this paper proposed a novel form of stellar spectrogram display, examining and analyzing the spectrogram from another perspective, used a new pattern to establish spectral model including Spectral lines by dial chart and provided the ability to search the spectrum of a specified star, which is unique and innovative. Using Mongo database to save tens of thousands of stellar parameters and PYECHARTS to show ring stellar spectrogram. This paper includes the significance of the project, the implementation of algorithm and the realization of functions.

Session 9: Intelligent Recognition Technology and Application

R003

Pyramid Deconvolution Net: Breast Cancer Detection Using Tissue and Cell Encoding Information

Mr. Dong Sui, Maozu Guo, Yue Zhang, FEI YANG, RUI ZHANG, Lei Zhang

Beijing University of Civil Engineering and Architecture, Beijing, China

Accurate diagnosis of breast cancer lesions from whole slide images (WSIs) is crucial for pathologist, since the results are associated with a certain status of breast cancer development. Until now, it is not yet possible to detect all of the cancerous areas in a WSIs. This limitation leads to mistakes or low detection precision in most of the approaches based on deep learning. In this paper, we propose an automatic cancer lesions detection approach using pyramid deconvolution network (PDN) for multi-level and multi-scale H&E stained breast pathological WSIs. Our workflow integrates tissue and cell level information for the cancerous region detection, and this is neglected by state-of-the-art methods. The high-level cancerous regions (macro) are obtained by deconvolution neuron network feature map from level 3 to level 9 in WSIs. The low-level cancer cells and region analysis pipeline is designed for detecting smaller region micro an ITCs from level 0. The results demonstrated that our workflow greatly improved the performance compared with those only using tissue level information.

R007

Captcha Recognition Based on Deep Learning

Ms.Li Zhou, JIALING Wang, WEIGANG LU,FEI YANG, RUI ZHANG,LEI ZHANG

Electrical & Information Engineering Shandong University, China

The captcha is a Turing test used to distinguish between machines and humans. It is considered as the verification code for the security on many websites. In recent years, deep learning has been widely used in the related field such as data analysis and computer vision. By applying deep learning method to captcha recognition, the vulnerabilities of the current captcha can be discovered, and the captcha can be further improved to reach a higher security level. This paper focuses on the captcha recognition based on deep learning, which is conducive to find the loopholes of current captcha to design more secure captcha. In this paper, the AlexNet neural network is analyzed in detail first, then the model is implemented to achieve captcha recognition for the simple and complex captcha data. The experiment results show that the recognition accuracy of the simple captcha and complex captcha data is close to 99%, and captcha recognition based on deep learning has a satisfied effect for recognition of captcha with different complexity.

R022

A Visual Method for Ship Encounter Pattern Recognition Based on Fuzzy Theory and AIS Data

Dr. Zhao Liangbin, Fu Xiuju

IHPC, Astar, Singapore

Visualization of ship encounter patterns helps to intuitively understand the risk situation in the water traffic. However traditional method based on fixed thresholds does not consider the fuzziness of classification on ship encounter. We proposed a visual method to visualize the risk situations caused by the interaction between vessel traffic flows in more detail based on fuzzy theory and AIS data. A case study is conducted to verify the applicability based on the AIS data from Singapore strait. Visualization results of density in grids show that the proposed method can effectively reflect the ship encounter pattern consistent with the real situation and more valuable details for the safety assessment of water traffic.

R023

Spatial Distribution and Epidemiological Characteristics of Foodborne Disease in Zhejiang Province, China

Ms.Ying Li, Juan Yang, Xueli Wang

Beijing University of Posts and Telecommunications, China

Foodborne Disease (FBD) is the most common disease around the world. Based on the surveillance data of FBD in Zhejiang Province from Jan 1, 2013 to Dec 31, 2015, including 26721 illness cases, 1591 hospitalizations and 6 deaths. We conducted exploratory data analysis to evaluate epidemiological characteristics. The spatial autocorrelation analysis and spatial-temporal cluster analysis were performed to detect the clusters at county level. The results show that the high peaks usually occurred in summer and autumn, and high-high pattern areas were mainly concentrated in the southwest counties. Most likely clusters were mainly located in the northern counties over the period from May to October, which deserved public's attention. Incidence rates of illness and hospitalization for males were higher than females. People in 18-35 group were suspected to FBD and the elderly over 60 had a highest hospitalized percentage. Peasants and children accounted for about 40% of illness cases, and over 50% of hospitalized cases were peasants (especially in spring and winter). Norovirus was the major cause in spring and winter, while *Vibrio parahaemolyticus* and *Salmonella* were the top two pathogens in summer and autumn.

R1001

Face Recognition from Art Face Images Based on Deep Learning

Ms. Zhexin Liang

Zhejiang University, China

The research of face recognition is one of the hot topics of computer vision. Recent models based on deep learning are very useful in many image processing problems. However, there are few researches on face recognition in art works. Based on the face data set in a newly released Japanese art work, we try to use deep learning to recognize the gender and identity of characters. We propose a stacked model of six deep learning models that achieves the best classification accuracies when compared with using these models separately. Our results achieve the best performance on this dataset so far.

Session 10: Business Intelligence and Information Management

R0002

Short-term Traffic Flow Prediction Based on Multi-Auxiliary Information

Kai Zhang, Mr. Buliao Jia, Yuhan Dong

Tsinghua Shenzhen International Graduate School, China

Aiming at the problem of short-term traffic flow prediction, on the basis of considering the dynamic change of traffic flow diffusion, this paper proposes a spatio-temporal prediction model that integrates multiple-auxiliary information, and carries out spatio-temporal modeling for the traffic flow state of a single detector, and then realizes the forecast goal of traffic flow. In this paper, firstly, based on the PageRank algorithm, the RoadRank algorithm is proposed to obtain the real-time traffic flow diffusion characteristics of the road network. Secondly, feature construction of multiple auxiliary information such as time, period, weather, etc., and on the basis of the above multiple auxiliary features, combined with the Encoder-Decoder framework that considers the attention mechanism, a spatio-temporal prediction model framework for multi-auxiliary information fusion is given. Based on METR-LA traffic dataset and NOAA weather dataset, a case study is carried out to verify effectiveness of multi-auxiliary features and superiority of the hybrid model.

R0004

LAC: LSTM AUTOENCODER with Community for Insider Threat Detection

Sudipta Paul, Dr. Subhankar Mishra

National Institute of Science, Education and Research Bhubaneswar India, India

The employees of any organization, institute or industry, spend a significant amount of time on computer network, where they develop their own routine of activities in the form of network transactions over a time period. Insider threat detection involves identifying deviations in the routines or anomalies which may cause harm to the organization in the form of data leaks and secrets sharing. If not automated, this process involves feature engineering for modeling human behavior which is a tedious and time-consuming task. Anomalies in the human behavior are forwarded to a human analyst for final threat classification. We developed an unsupervised deep neural network model using LSTM AUTOENCODER which learns to mimic the behavior of individual employees from their day-wise time stamped sequence of activities. It predicts the threat scenario via significant loss from anomalous routine. Employees in a community tend to align their routine with each other rather than the employees outside their communities, this motivates us to explore a variation of the AUTOENCODER, LSTM AUTOENCODER- trained on

the interleaved sequences of activities in the Community (LAC). We evaluate the model on the CERT v6.2 dataset and perform analysis on the loss for normal and anomalous routine across 4000 employees. The aim of our paper is to detect the anomalous employees as well as to explore how the surrounding employees are affecting that employees' routine over time.

R001

Stock Selection Strategy Based on Support Vector Machine and eXtreme Gradient Boosting Methods

Ms. LIU Haoyue

Shanghai University, China

Quantitative investment has emerged a new trend in the advance of artificial intelligence during recent years. Artificial intelligence algorithms have been widely used in stock selection. In this paper, China's stock data, including opening price and closing price, from 2008 and 2017 were selected as samples. The problem of stock selection and strategy was taken into consideration as a classification problem. The investment strategies were established based on the Support Vector Machine (SVM) and eXtreme Gradient Boosting (XGBoost) algorithms. In addition, the strategies were back-tested, and analyzed by a series of evaluation criteria. Finally, it is found that the return results of these two models are far above the benchmark HS300 Index yield. The stock selection strategy based on XGB has 17.2% Annualized Returns, 0.40 Max Drawdown, 0.67 Information Ratio, and 0.57 Sharp Ratio. It means that the strategy performance based on XGBoost outperforms SVM. The method in this study can be also applied in other stock market such as American stock market and guide the stock investment.

R006

Prediction Method of User's Consumption Behavior in E-commerce Platform Based on RNN Optimization Algorithm

Ms. JingHui Cai, Tianyu Xia, Yue Qi

Jinan University, China

In recent years, the popularity of the Internet makes the public more inclined to online shopping, which breaks through the limitation of time and region. There are many kinds of online goods, which make the platform users have to spend a lot of energy to choose goods. In order to better refine the shopping needs of e-commerce platform users, we can mine the online shopping behavior and transaction data of users to predict the future shopping behavior of users, so as to guide the platform to adjust accordingly. Based on the real data of Taobao shopping platform, this paper conducts data mining on the user's behavior. Firstly, it processes the data outliers, removes the noise from the original data, removes the default value, and then constructs other different feature combinations from the dimension of the goods, which are more in line with the characteristics of the data, and extracts the features. The statistical behavior data is filtered and processed. The recurrent neural network (RNN) algorithm is used to classify the user behavior sequence, and the user's behavior tendency score is obtained. Then the score is regarded as a new feature, and the naive Bayesian algorithm is used to optimize the recurrent neural network for further prediction. The results are compared with those obtained by using a simple Bayesian algorithm. The test results show that the method proposed in this paper is more stable and can reduce the impact of the length of time series on the prediction accuracy. The prediction accuracy is also improved compared with a single naive Bayesian model, which has better practicability.

R1003

Design of dynamic H-R diagram System

Mr. Cao Zhi, Jingchang Pan, Guo Fengyue

Shandong University, China

Hertzsprung–Russell diagram (HRD) is an important tool in stellar astronomy, and it is of great significance to study the evolution of stars. With the continuous increase of astronomical big data, the generation speed of HRD is getting slower and slower. The rapid generation of HRD is of great significance to scientific research and the popularization of astronomy . In this paper, a dynamic HRD generation system is established by improving the HRD generation algorithm. The main content of this paper is the design and implementation of the algorithm for quickly generating HRD through coordinate index.

***We're Looking forward to seeing you at CIIS
2021 in Tokyo!***