2019 2nd Artificial Intelligence and Cloud Computing Conference
(AICCC 2019)

21-23, December, 2019

Kobe University, Japan

Supported by

Indexed by

Welcome Message from Organizing Committee

It is our great pleasure to invite you to join our international conferences - 2019 2nd Artificial Intelligence and Cloud Computing Conference (AICCC 2019). This event will provide a unique opportunity for editors and authors to get together and share their latest research findings and results. We look forward to welcoming you at Kobe.

We're confident that over the two days you'll get the theoretical grounding, practical knowledge, and personal contacts that will help you build long-term, profitable and sustainable communication among researchers and practitioners working in a wide variety of scientific areas with a common interest in Artificial Intelligence and Cloud Computing.

On behalf of all the conference committees, we would like to thank all the authors as well as the technical program committee members and reviewers. Their high competence, their enthusiasm, their time and expertise knowledge, enabled us to prepare the high-quality final program and helped to make the conference become a successful event.

We truly hope you'll enjoy the conference and get what you expect from the conference.

Organizing Committee
December 21, 2019

2019 2nd Artificial Intelligence and Cloud Computing Conference

Table of Contents

Keynote Speakers Introductions

Keynote Speaker I

Prof. Kenji Suzuki
Tokyo Institute of Technology, Japan

Kenji Suzuki, Ph.D. (by Published Work; Nagoya University) worked at Hitachi Medical Corp., Japan, Aichi Prefectural University, Japan, as a faculty member, and in Department of Radiology, University of Chicago, as Assistant Professor. In 2014, he joined Department of Electric and Computer Engineering and Medical Imaging Research Center, Illinois Institute of Technology, as Associate Professor (Tenured). In 2017, he was jointly appointed in World Research Hub Initiative (WRHI), Institute of Innovative Research (IIR), Tokyo Institute of Technology, Japan, as Specially Appointed Professor (equivalent to Visiting Professor). He published 330 papers, including 110 peer-reviewed papers in leading journals such as IEEE TPAMI (Impact Factor: 17.7), IEEE TIP (IF: 6.8), IEEE TSP (IF: 5.2), and IEEE TMI (IF: 6.1). He has been actively studying deep learning in medical imaging and computer-aided diagnosis in the past 25 years, especially his early deep learning model was proposed in 1994, deep learning for image processing in 2004, receptive fields in 2004, semantic segmentation in 2004, U-net model in 2006, end-to-end deep learning in 2009, and deep learning reconstruction in 2010. His papers were cited more than 13,000 times, and his h-index is 48. He is inventor on 30 patents (including ones of earliest deep-learning patents), which were licensed to several companies and commercialized via FDA approvals. He published 11 books and 22 book chapters, and edited 13 journal special issues. He was awarded a number of grants as PI including NIH R01, ACS, JST, and NEDO grants. He served as the Editor-in-Chief/Associate Editor or Guest Editor of a number of leading international journals, including Pattern Recognition (IF: 5.9) and Neurocomputing (IF: 4.0). He served as a referee for 114 international journals such as Science Translational Medicine (IF: 17.1) and Nature Communications (IF: 11.9), an organizer of 93 international conferences, and a program committee member of 98 international conferences. He gave 120 invited talks and keynote speeches at international conferences. He received 26 awards, including Springer-Nature EANM Most Cited Journal Paper Award 2016 and 2017 Albert Nelson Marquis Lifetime Achievement Award. His research was covered in 49 articles in newspapers, magazines and journals by press and media, including Lancet Respiratory Medicine (IF: 23.0).

Keynote Speaker II

Prof. Tao Zhang
North China University of Technology, China

Prof. Tao Zhang is a full professor in school of information, North China University of Technology (NCUT). He received his phd degree in computer science from Kent State University in 1995. From September 1982 to August 1985, he worked in the image processing and scientific computation research office of the 203rd institute of the ministry of electromechanical industry. From June 1988 to January 1991, he was director of system and network department in Beijing Lenovo electronic technology co., ltd. From May 1993 to September 1995, he was Chief scientific adviser, north American headquarters, Volkswagen group, Germany. From September 1995-september 1996, he became senior banking consultant of IBM banking division, United States. From September 1996 to September 2000, he worked as vice President of technology and operations, bank of America. From September 2000 to March 2003, he was the CTO of PRECOM, a Silicon Valley company. In 2003, he came back to China and founded the Wise-Code Information Technology Co.,Ltd. It has designed and developed 18 software products with independent intellectual property rights, which have been widely used in the fields of banking, government, telecommunications, education, tobacco, urban construction, manufacturing and software outsourcing, etc. He is currently the chief technical expert of the National Golden Shield project, the overseas Senior Technical Adviser of the CBRC, the chief scientist of Beijing Aerospace Changfeng Co., Ltd., President of Electronic branch of Beijing Expert Association and Vice President of Western Returned Students' Club. His research interests include the application of neural network in the field of big data analysis, business process synergy integration, knowledge base, rule engine trigger, unified data exchange synchronization, big data and analysis mining, etc.

Keynote Speaker III

Prof. Chiharu Ishii

Faculty of Science and Engineering, Hosei University, Japan

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

Keynote Speaker IV
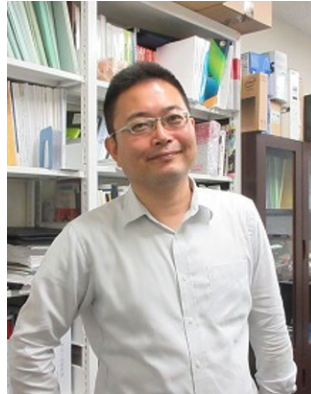
Prof. Masahide NAKAMURA
Kobe University, Japan

Masahide Nakamura received the B.E., M.E., and Ph.D. degrees in Information and Computer Sciences from Osaka University, Japan, in 1994, 1996, 1999, respectively. From 1999 to 2000, he has been a post-doctoral fellow in SITE at University of Ottawa, Canada. He joined Cybermedia Center at Osaka University from 2000 to 2002. From 2002 to 2007, he worked for the Graduate School of Information Science at Nara Institute of Science and Technology, Japan. He is currently an associate professor in the Graduate School of System Informatics at Kobe University. In 2015, he worked for Universite Grenoble Alpes as a visiting professor. In 2018, he starts working for RIKEN, Center for Advanced Intelligence Project (AIP), as a visiting researcher. His research interests include the service/cloud computing, smart home, smart city, and life log. He is a member of the IEEE, ACM, IEICE and IPSJ.

Conference Introductions

Welcome to 2019 AICCC Kobe conference. This conference is organized by ACM Chapter Singapore. The objective of the conference is to provide a platform for researchers, engineers, academicians as well as industrial professionals from all over the world to present their research results and development activities on Artificial Intelligence and Cloud Computing. **Papers will be published in the following proceeding:**

International Conference Proceedings Series by ACM (ISBN: 978-1-4503-7263-3), which will be archived in the ACM Digital Library, and indexed by Ei Compendex, Scopus and submitted to be reviewed by Thomson Reuters Conference Proceedings Citation Index (ISI Web of Science).

Conference website and email： http://www.aiccc.net and aiccc.contact@gmail.com

Conference Venue

Japan-Engineering School, Kobe University, Japan

Add: 1-1, Rokkodai-cho, Nada-ku, Kobe, 657-8501, Japan

Engineer School established in April 2007 as an educational and research institute aimed at providing engineering knowledge, fundamental and applied technologies directly related to a symbiosis and sustainable development of society. Departments in this Graduate School is arranged in a similar way as the Faculty of Engineering to offer a consistent educational system from undergraduate to graduate school. The Graduate School of Engineering offers the following five departments in both the Master's and Doctoral Programs: Architecture, Civil Engineering, Electrical and Electronic Engineering, Mechanical Engineering, and Chemical Science and Engineering. By covering a wide range of interdisciplinary academic fields (environment, nanomaterial, information and telecommunication, life science, energy, robot, safety etc.), these five departments will create new technologies for the betterment of society.

Kobe University is located on a hill side in a residence area and there is no hotel around university. We recommend participants to stay at a hotel in the downtown Kobe, Kobe Sannomiya. You can find how to access to Kobe Sannomiya and Rokkodai Campus, Kobe University below:
https://www.kobe-u.ac.jp/en/campuslife/campus_guide/campus/index.html

We strongly recommend to take an Airport Limousine bus if you come from Kansai Airport. You can find hotels at the following sites.
Rakuten Travel: https://travel.rakuten.com/
Expedia: https://www.expedia.co.jp/

Registration Guide

December 21, 2019 (Saturday)

Time: 10:30~17:00

Venue: Engineering School, Kobe University, Japan

Add: 1-1, Rokkodai-cho, Nada-ku, Kobe, 657-8501, Japan

Registration Steps

1. Arrive at Engineering School, Kobe University, Japan;

2. Inform the conference staff of your paper ID;

3. Sign your name on the Participants list;

4. Sign your name on Lunch & Dinner requirement list;

5. Check your conference kits: (1 conference program, 1 lunch coupon, 1 dinner coupon, 1 receipt, 1 name card, 1 flash disk (papers collection), 1 laptop bag);

6. Finish registration.

Tips: Please arrive at the conference to upload or copy Slides (PPT) into the laptop room 10 minutes before the session begins.

Note:

(1) The organizer doesn't provide accommodation, and we suggest you make an early reservation.

(2) One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on December 22, 2019.

(3) One day tour includes lunch but does not include attractions tickets, and participants need to take care of themselves.

* One regular registration can cover one participant.

*The organizers cannot accept liability for personal injuries, or for loss or damage of property belonging to meeting participants, either during, or as a result of the meeting. Please take care of all your belongings.

*Along with your registration, you will receive your name badge, which must be worn when attending all official conference sessions and activities. Participants without a badge will not be allowed to enter the venue building. Please don't lend your name badge to others.

Presentation Instructions

Instructions for Oral Presentations

Devices Provided by the Conference Organizer:

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

Materials Provided by the Presenters:

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

Duration of each Presentation (Tentatively):

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

Instructions for Poster Presentation

Materials Provided by the Conference Organizer:

The place to put poster

Materials Provided by the Presenters:

Home-made Posters
Maximum poster size is A1
Load Capacity: Holds up to 0.5 kg

Best Presentation Award

One Best Presentation will be selected from each presentation session, and the Certificate for Best Presentation will be awarded at the end of each session on December 22, 2019.

Dress code

Please wear formal clothes or national representative of clothing.

2019 2nd Artificial Intelligence and Cloud Computing Conference

Schedule for Conference

Room C2-302, Engineering School, Kobe University, Japan, December 21(10:30-17:00)
Arrival and Registration
Room C1-301, Engineering School, Kobe University, Japan, December 22 (9:00-12:35)
Opening Remark (9:00-9:15) Host: Prof. Seiichi OZAWA, Kobe University, Japan Speaker: Prof. Masa-Hiko Saito, Kobe University, Japan
Keynote Speech I (9:15-10:00) **Title: Deep Learning for Image Processing, Patten Recognition, and Diagnosis in Medicine** Prof. Kenji Suzuki, Tokyo Institute of Technology, Japan
Keynote Speech II (10:00-10:45) **Title: Intelligent Applications of Loan Risk Control Based on Financial Big Data Technology** Prof. Tao Zhang, North China University of Technology, China
Coffee Break & Group Photo (10:45-11:05)
Keynote Speech III (11:05-11:50) **Title: Practical Application of the Power Assist Suits** Prof. Chiharu Ishii, Hosei University, Japan
Keynote Speech IV (11:50-12:35) **Title: Image as a Document: Towards Affordable and Practical Home Context Recognition** Prof. Masahide NAKAMURA, Kobe University, Japan
Lunch (12:35-13:30)
Room C1-301/ Room C2-301, Engineering School, Kobe University, Japan, December 22 (13:30-18:15)

Session 1 (13:30-15:45) - Room C1-301 Session Chair: Prof. Seiichi OZAWA	**Session 2 (13:30-15:45)** - Room C2-301 Session Chair: Prof. Masahide NAKAMURA

Coffee Break (15:45-16:00)	
Session 3 (16:00-18:15) - Room C1-301 Session Chair: Prof. Tao Zhang	**Session 4 (16:00-18:15)** - Room C2-301 Session Chair: Prof. Chiharu Ishii

Poster session (10:30-12:35) Session Chair: Prof. Kenji Suzuki
Dinner (18:30-19:30)
December 23 (9:00-16:00)
One-Day Visit & Tour

Morning Session

Morning, December 22, 2019 (Sunday)

Time: 9:00~12:35

Venue: Room C1-301, Engineering School, Kobe University, Japan

Opening Remarks (9:00~9:15)

Hosted by Prof. Seiichi OZAWA from Kobe University, Japan
Addressed by Prof. Masa-Hiko Saito from Kobe University, Japan

Keynote Speech I (9:15~10:00)

Title: Deep Learning for Image Processing, Patten Recognition, and Diagnosis in Medicine

Prof. Kenji Suzuki
Tokyo Institute of Technology, Japan

Abstract— It is said that artificial intelligence (AI) driven by deep learning would make the 4th Industrial Revolution. Deep leaning becomes one of the most active areas of research in computer vision, pattern recognition, and imaging fields, because "learning from examples or data" is crucial to handling a large amount of data ("big data") coming from imaging systems. Deep learning is a versatile, powerful framework that can acquire image-processing and analysis functions through training with image examples; and it is an end-to-end machine-learning model that enables a direct mapping from raw input data to desired outputs, eliminating the need for handcrafted features in conventional feature-based machine learning. I invented ones of the earliest deep-learning models for image processing, semantic segmentation, object enhancement, and classification of patterns in medical images. I have been actively studying on deep learning in medical imaging in the past 23 years. In this talk, medical image processing, pattern recognition, and AI-aided diagnosis with deep learning are introduced, including 1) computer-aided diagnosis for cancer in CT and x-ray images, 2) semantic segmentation of lesions and organs in medical images, 3) separation of bones from soft tissue in chest radiographs, and 4) radiation dose reduction by reducing noise and artifact in CT and mammography.

Keynote Speech II (10:00~10:45)

Title: Intelligent Applications of Loan Risk Control Based on Financial Big Data Technology
Prof. Tao Zhang
North China University of Technology, China

Abstract— Intelligent Technology Applications of Loan Risk Control Based on Financial Big Data, Deep Learning, Machine Learning, Cloud Computation, and Block Chain technology are about how to prepare data warehouse, extract the features of data, draw the precise outline of potential customers who are going to borrow money, and build the models of risk control for borrowers so that lenders can decide can we lend our money to the customer, how much money to be landed to him, how much interest we can take from him before the loans can be granted. How do we control the risk during the loans of the customers, how to manage the risk after the loans. The speech will be talking about the algorithms applied onto the different phases of processes of loans, data ETL, data classification and cluster analysis, data modelling and analysis, deep learning and machine learning. It will be talked about the architectures of information technology for the workable intelligent loan system implementation, business processes of the loans, strategy of the loans, scoring of borrower behavior, scoring of borrower credits, knowledge base, and decision & inference engine. The contents can be used to design a real system of loans.

Coffee Break & Group Photo Taking 10:45~11:05

Keynote Speech III (11:05~11:50)

Title: Practical Application of the Power Assist Suits

Prof. Chiharu Ishii
Hosei University, Japan

Abstract— Japan has reached to the super-aging society. Therefore, needs of nursing care for elderly people are increasing. In practice, however, 80% of caregivers have low back pain due to the nursing care such as transfer work. Hence, the equipment that reduces the burden of caregiver's waist is required. To help caregivers, many kinds of power assist suits have been developed, so far. However, conventional power assist suits have the following problems. Those are heavy, expensive and hard to put on the suit. Therefore, by following advices from caregivers who are working in nursing home, we developed a vest type power assist suit for the purpose of practical use in nursing care. The newly developed assist suit was termed "Cool Vest", which has characteristic that is lightweight, low cost and easy to put on and take off.
On the other hand, also in agriculture or the construction site, low back pain becomes a problem due to aging of the worker. Therefore, we developed an outdoor type power assist suit to ease the burden on the waist for work in a half sitting posture, which was termed "Aero Back". Aero Back is commercially available now.

In addition, other assist suits developed in my Laboratory, such as leg part exoskeleton and arm part endoskeleton for rehabilitation, and assist suit for walking support, are also introduced.

Keynote Speech IV (11:50~12:35)

Title: Image as a Document: Towards Affordable and Practical Home Context Recognition
Prof. Masahide NAKAMURA
Kobe University, Japan

Abstract— Technologies for the home context recognition have been studied for many years in the field of ubiquitous computing. The traditional ubiquitous computing employs ambient sensors (e.g., temperature, humidity, presence), wearable sensors (e.g., accelerometer, heart rate), and indoor positioning systems. In more recent years, the emerging deep learning allows the system to recognize multimedia data. Since image, voice, and text data usually contain richer information than the conventional sensor data, it is promising to use such multimedia data for recognizing the home contexts.

Unfortunately, however, these existing technologies are yet far from practical use in general households, since they require expensive resources at home. It is difficult for ordinary users to operate and maintain proprietary systems at home on a daily basis. One may try to recognize home contexts via image recognition based on deep learning. However, constructing a custom recognition model dedicated for a single house requires a huge amount of labeled datasets and computing resources. Thus, there is still a big gap between research and real life.

To achieve more affordable and practical home context recognition, we present a novel technique that integrates image-based cognitive API and light-weight machine learning. The cognitive API receives an image from an external application, recognizes specific information within the image, and returns the information as a set of text words called tags. Our key idea is to use these tags as features of the image, and apply light-weight machine learning techniques to infer the target context. Since every image can be considered as a document, the expensive deep learning is no more needed. We call this idea the image-as-a-document approach.

To demonstrate the practical feasibility, we have conducted an experiment that recognizes contexts within our laboratory. The experimental results showed that the overall accuracy of the recognition model was 0.929. We also present further approach to improve the accuracy, by exploiting multiple cognitive APIs.

Lunch 12:35~13:30

Oral Presentation Abstracts

Session 1 (13:30-15:45)

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

Afternoon, December 22, 2019 (Sunday)

Time: 13:30-15:45

Venue: Room C1-301, Engineering School, Kobe University, Japan

Session Chair: Prof. Seiichi OZAWA

AI0011-A Presentation 1 (13:30-13:45)
How Account Takeover Botnets Outsmart Traditional Security Controls
Yury Geiler and Nadav Avital
Imperva, Israel

Abstract— Account Takeover (ATO) describes when an online account is accessed and/ or used by someone other than its legitimate owner, usually for malicious purposes. Account Takeover attacks happen when an attacker is trying to get unauthorized access to an account or when the account has already been compromised and the attacker uses the account for a malicious purpose, such as unauthorized access or data theft.

Although the risk is not new, Account Takeovers pose one of the top risks for financial loss for corporations and individuals today. The reality is that businesses rely on limited detection methods like static security rules, rate limit and bot protection. These methods work well on technical attacks like SQL injection or cross site scripting.

However, those methods are less effective against business logic attacks such as ATO that target as today's ATO attackers use advanced tools and a widely-distributed infrastructure that allows them to operate at a slow steady rate, impersonate legitimate clients and to morph the attack when needed.

In this presentation we will present a novel method, based on a machine learning approach to expose ATO botnets.

AI1001 Presentation 2 (13:45-14:00)

Prediction of Meningitis Outbreaks in Nigeria using Machine Learning Algorithms

Xiaoyu Tian[1], Qingqing Xu[2] and Yifan Wang[3]

1. Mccallie School, United States; 2. University of Houston, United States; 3. University of California Berkeley, United States

Abstract— Meningitis is a huge public health concern in Nigeria. In this paper, we attempted to use data from patient's clinic records between 2009 and 2018 to predict future incidence of meningitis in Nigeria [1]. Five machine learning methods, namely, logistic regression, k-nearest neighbors (KNNs), random forests, support vector machine (SVMs) and neural networks (NNs) were adopted to build prediction models and their accuracy of prediction were compared. Machine learning models built in this study achieved an accuracy of over 95%. Accurate prediction of meningitis outbreaks in a country that is severely affected by the disease such as Nigeria will greatly help in optimizing the disease management. Health care personnel and resources can be allocated more efficiently to take actions against any breaks in advance. Future research is needed to test the models in other patient populations.

AI0023 Presentation 3 (14:00-14:15)

Forecasting Dengue Incidence with the Chi-squared Automatic Interaction Detection Technique

Kittisak Kerdprasop[1], **Nittaya Kerdprasop**[1], Paradee Chuaybamroong[2]

1. Suranaree University of Technology, Thailand; 2. Thammasat University, Rangsit Campus, Thailand

Abstract— This paper presents the data-driven approach to forecast number of dengue infection in the two populated provinces of Thailand: Bangkok and Nakhon Ratchasima. Our forecasting technique is the chi-squared automatic interaction detection (CHAID), which is a machine learning approach that adopts decision tree as a main data structure for building a model and applies a chi-square computation for node splitting. The CHAID algorithm is in a group of multivariate data analysis in that it takes more than one attributes to build a model. The input data used in our model building phase are from the remote sensing, oceanic sensors, and ground sources. Remote sensing data are indices obtained from the NOAA satellite. These indices are used as representatives to assess temperature, humidity and brightness in the atmosphere as well as the greenness conditions of plants over the specific Earth surface areas. The oceanic sensor data are ONI index computed by NOAA to announce El Nino or La Nina events, which are assumed to affect the growth rate of mosquito larva. From the model assessment, we found that the multivariate CHAID models in both provinces are more accurate than the univariate autoregresive integrated moving average (ARIMA) models that are currently used by the Thai public health practitioners. We also compare predictive performance of CHAID models against those obtained from other machine learning techniques. The CHAID models outperform the others. The induced CHAID model is thus considered efficient enough to be applied for predicting number of dengue infected patients.

AI0015 Presentation 4 (14:15-14:30)

Robust Non-negative Matrix Factorization Based on Noise Fuzzy Clustering Mechanism

Masaaki Ueno, Katsuhiro Honda, Seiki Ubukata and Akira Notsu

Osaka Prefecture University, Japan

Abstract— Nonnegative matrix factorization (NMF) is a basic decomposition method of matrices consisting only of nonnegative values and has been utilized in various fields including air pollution analysis. This paper proposes an approach for noise rejection in NMF through noise clustering mechanism with the goal of eliminating the influence of noise observation. Robust estimation is realized by utilizing the least squares criterion of NMF not only for NMF model estimation but also for calculating the degree of belongingness to noise clusters in the framework of alternate optimization. The characteristics of the proposed method is demonstrated in a toy example with an artificial data set followed by a task of air pollutant measurement analysis.

AI0025 Presentation 5 (14:30-14:45)

Categorical Modeling Method to Analyze Factors Relating to Longevity of Populations in the East and Southeast Asia

Nittaya Kerdprasop[1], Kittisak Kerdprasop[1] and Paradee Chuaybamroong[2]

1. Suranaree University of Technology, Thailand; 2. Thammasat University, Rangsit Campus, Thailand

Abstract— We propose in this work the categorical modeling method based on machine learning techniques to analyze environmental and economic factors anticipating to affect longevity patterns of people. The advantage of categorical modeling from the original numeric data is that the derived models are concise and easy for interpretation. We apply various learning algorithms during the modeling phase and it turns out that decision tree learning shows the best performance in classifying level of longevity according to the important factors. The classification accuracies on various countries range between 85 to 100%. The tree models also reveal prominent economic and environmental factors affecting longevity of populations living in the East and Southeast Asia regions including Japan, South Korea, Singapore, Thailand, Malaysia, Indonesia, and Vietnam. Even though the derived models differ from one country to another, there exists one common environmental factor showing negative impact to longevity in every model. This factor is the particulate emission damage, which is the loss of life due to exposure to ozone pollution and concentrations of particulates less than 2.5 microns in diameter, or PM2.5. Electric power consumption at the moderate level shows positive impact toward long life in almost every country, except Japan. The two most important environment factors appear in the longevity pattern of Japanese population are particulate emission damage and forest depletion.

AI0037-A Presentation 6 (14:45-15:00)

Multi-objective Shortest Path Heuristics for Multimodal Networks

Aaron Bramson

GA Technologies, Japan

Abstract— Route planning is a classic AI problem with applications to autonomous vehicles, robots, navigation software, and many others. Although there are numerous methods to solve or approximate the single-objective shortest path in simple, static networks, multi-objective planning and optimization are clearly critical for generating useful trajectories in real-world problem spaces. Within transportation networks, multimodal network analysis (combining trains, buses, cars, bicycles, etc.) is receiving increasing attention, especially in Asian and European contexts where people's commutes often rely on multiple modes of transportation. In order to evaluate the effects of ride-share programs, mobility as a service (MaaS) policies, new transportation routes, alternative route selection incentive programs, emergency response systems, etc., it is necessary to realistically approximate the routes taken by individuals when facing alternatives. The ability to generate realistic routes between origin-destination pairs requires solving the multi-objective shortest path problem on multimodal networks. Here we present novel methods to integrate multiple considerations (traversal time, cost, number of transfers, mode preference, crowdedness aversion, etc.) into route scoring algorithms. The results are evaluated on the Greater Tokyo Area multimodal transportation network. We conclude that for many practical applications, a heuristic approach provides acceptable accuracy with considerable computational time improvement.

AI0022 Presentation 7 (15:00-15:15)

Forecasting dengue fever epidemics using ARIMA model

Patsaraporn Somboonsak

Chandrakasem Rajabhat University, Thailand

Abstract— Despite the control and surveillance of dengue fever in various ways, but still found many dengue patients in Thailand every year. The objective of this research is to develop a model for predicting the dengue fever epidemic. Model development on data of dengue fever outbreaks in Northeast Thailand. The ARIMA model and the Gaussian Distribution model to predict the incidence of dengue fever. Dengue patient data from 2015 to 2019 are used to validate the accuracy of predictive models. The autocorrelation function is measured as the correlation between dengue fever data of lag suggested parameters ARIMA (2,1,2), and partial autocorrelation function is defined as the difference between the autocorrelation coefficient at a certain lag 20 with ARIMA (1,2,2). The best models are ARIMA (2,1,2) evaluated an excellent forecasting performance dengue fever epidemic with lower mean absolute percentage error (MAPE) of 1148.319, lower Bayesian information criterion (BIC) of 13679.5133 and Akaike information criterion (AIC) of 13710.0388. The results will benefit health professionals. Moreover, the model can be used for policymaking and planning of resource allocation for the people and continue to improve public health services.

AI0016-A Presentation 8 (15:15-15:30)

Neural stochastic control application: Optimal portfolio allocation

Kevin Noel

Rakuten, Japan

Abstract— Neural controlling is a growing field in stochastic optimal control applied to dynamical systems. Neural controlling has the benefit of being a no-parametric compute process, thus generic to a large class of optimization problem. In this paper, we consider applying "neural control" principles to the classic problem of optimal portfolio allocation. Then, we recall the generic associated stochastic control problem and this is then solved by parameterizing the optimal control with various Deep Neural Networks. We characterize the benefit of each Neural Network architecture: Stacked Feedforward, LSTM and Attention LSTM for time-dependent optimal control problem. In part 2 of this research study, we will characterize the benefit of each neural controller for the portfolio allocation problem, particularly the effec of long term range memory. In the coming future, we expect further development in the field of "neural control", with application to quantitative finance, optimal control in supply/demand and econometrics.

AI0040 Presentation 9 (15:30-15:45)

A Comparative Study of Unsupervised Classification Algorithms in Multi-Sized Data Sets

Syed Quddus[1] and Adil Bagirov[2]

1. University of Bahamas, Bahamas; 2. Federation University, Australia

Abstract— The ability to mine and extract useful information automatically, from large data sets, is a common concern for organizations, for the last few decades. Over the internet, data is vastly increasing gradually and consequently the capacity to collect and store very large data is significantly increasing.
Existing clustering algorithms are not always efficient and accurate in solving clustering problems for large data sets. However, the development of accurate and fast data classification algorithms for very large scale data sets is still a challenge.
In this paper, we present an overview of various algorithms and approaches which are recently being used for Clustering of large data and E-document. In this paper, a comparative study of the performance of various algorithms : the global k-means algorithm (GKM), the multi-start modified global k-means algorithm (MS-MGKM), the multi-start k-means algorithm (MS-KM), the difference of convex clustering algorithm (DCA), the clustering algorithm based on the difference of convex representation of the cluster function and nonsmooth optimization (DCClust, is carried out using C++.

Session 2 (13:30-15:45)

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

Afternoon, December 22, 2019 (Sunday)

Time: 13:30-15:45

Venue: Room C2-301, Engineering School, Kobe University, Japan

Session Chair: Prof. Masahide NAKAMURA

AD2001-A Presentation 10 (13:30-13:45)
Features suitable for video thumbnails on portable devices
Yusuke Yoneda and Nobuyuki Umezu
Ibaraki University, Japan

Abstract— As the technology used in portable devices such as smartphones and tablets advances, the total number of videos stored in one device is becoming enormous. The screen size of such a device is limited because it should be portable, and the number of thumbnail images of the videos displayed at a time is also limited to fit in the fixed-size screen. An appropriate thumbnail image that is much more representative of the video content, rather than just always cropping the first frame of the video as a thumbnail, could be greatly help users find particular contents in their portable devices. We propose to study video features that could affect on the suitability of video frames to be the representative thumbnail. We conducted a series of user experiments to measure user-defined suitability values of various video frames. We then make comparison with these values with features such as the amount of object movements, audio loudness, number of human faces, that are extracted from video frames. Our findings can be used to automatically select an appropriate frame of each video for its thumbnail.

AI0005 Presentation 11 (13:30-13:45)

Optimal Tuning of Fractional-Order PI\lambdaD\muA\nu Controller by Cuckoo Search Algorithm

Montree Cheunpirom, Sarot Hlangnamthip and Deacha Puangdownreong

Southeast Asia University, Thailand

Abstract— The fractional-order proportional-integral-derivative-accelerated (PI\lambdaD\muA\nu) controller (or FOPIDA) is proposed in this paper. It is the generalization of the PID controller family. The fractional-order PI\lambdaD\muA\nu controller consists of seven parameters, i.e. the proportional gain Kp, the integral gain Ki, the derivative gain Kd, the accelerated gain Ka, the integral order lambda, the derivative order mu and the accelerated order nu. All orders are real rather than an integer. This makes the PI\lambdaD\muA\nu controller more flexible in design for a wide range of dynamic systems. To perform its effectiveness, the optimal tuning of the fractional-order PI\lambdaD\muA\nu controller via the cuckoo search (CS), one of the most efficient metaheuristic optimization techniques, is proposed for two real-world motor position control systems based on the modern optimization context. Simulation results show that the proposed fractional-order PI\lambdaD\muA\nu controller optimized by the CS can provide very satisfactory responses with faster and smoother than the conventional integer-order PIDA (or IOPIDA) controllers.

AD0007 Presentation 12 (14:00-14:15)

Image Watermarking based on Modified Harmonic Mean Filter

Thitiporn Pramoun[1], Sanan Srakaew[2] and Thumrongrat Amornraksa[2]

1. Srinakharinwirot University, Thailand; 2. King Mongkut's University of Technology Thonburi, Thailand

Abstract— In this paper, a spatial domain image watermarking method based on the modified harmonic mean filter is proposed. In the embedding process, the blue component of a color image in the RGB color space is modified to embed a binary watermark image with the same size. In the extraction process, the embedded watermark is blindly extracted without the need of original image. The harmonic mean filter is considered and modified by using the concept of outliers in the filtering area. The modified harmonic mean filter is then applied to the watermarked image to obtain a better prediction of original image. The extracted watermark can finally be achieved by subtracting the predicted image from the watermarked one. Set of experiments are carried out to verify its efficiency. The performance of the proposed method in terms of weighted Peak Signal to Noise Ratio and Normal Correlation is evaluated and compared with the previous watermarking methods. Its robustness against attacks is also evaluated using the Stirmark benchmark. According to the results obtained, the proposed method provides a higher robustness on average at equivalent quality of watermarked image, compared to the existing methods.

AD0008 Presentation 13 (14:15-14:30)

Game Genre Classification from Icon and Screenshot Images Using Convolutional Neural Networks

Chayanin Suatap and Karn Patanukhom

Chiang Mai University, Thailand

Abstract— In this paper, we study game genre classification using typical game images provided in game stores such as an icon or screenshots. The proposed method is based on a convolutional neural network and a soft voting ensemble technique. Network depth and dropout strategy are examined to obtain the best network architecture for performing the task. The ensemble technique is applied to boost the classification accuracy. Experiments are conducted on Android game dataset that consists of 25,001 icon images and 180,553 screenshots from 17 game genres. Our proposed method can achieve 40.3% and 46.7% classification accuracies for single icon and screenshot classification tasks, respectively. It also outperforms the human performance in both tasks. In addition, it can provide accuracy of 55.3% when multiple screenshots and icon of the game are used together for classifying their genre.

AD0011 Presentation 14 (14:30-14:45)

Road Boundary Detection for Straight and Curved Lane Lines

Fabien Rakotondrajao[1] and Kharittha Jangsamsi[2]

1. ESIEA Graduate Engineering School Laval, France; 2. KMUTT Bangkok, Thailand

Abstract— This paper addresses the difficulty of detecting and/or verify road boundary markings from road images. The 2-D road images usually contain the perspective effect/distortion because of the acquisition process resulting in an inaccuracy of the lane detection. We thus propose an approach for road boundary detection in both straight and curved lane lines. The Inverse Perspective Mapping (IPM) is performed using the automatic point selection. The polynomial regression is applied to approximate equations for each road boundary markings, i.e. left and right lane markings, from two dataset of points and then draw the lines. The slopes of both equations are also exploited for identifying the direction of road lane. Our proposed method is efficient and very practical to implement with the existing lane detection method, as shown in the experimental results.

AI0027-A Presentation 15 (14:45-15:00)

Deep Belief Network as Hand Gesture Recognition Method In Human Computer Interaction

Agustinus Rudatyo Himamunanto[1], Supriadi Rustad, Guruh Fajar Shidik[2] and M. Arief Soeleman[2]

1. Universitas Kristen Immanuel, Indonesia; 2. Universitas Dian Nuswantoro, Indonesia

Abstract— Research on the use of hand gestures as a medium of interaction between humans and machines is still intensively carried out by researchers to provide alternative studies of interaction media. This paper discusses the results of experiments with hand gesture input used for operations: click, doubleclick, drag, group (select more than 1 menu object). Deep Belief Network (DBN) algorithm plays a role in the process of recognition of hand gestures in the medium of interaction between humans and computers. The hand gesture recognition process consists of three stages, namely the segmentation of the hand area, the extraction of the characteristics of the hand gestures and the recognition of the patterns of the hand gestures. The hand gesture recognition process is carried out in real time based on human hand input. The experimental results show that the DBN method works quite well and is quite fast in recognizing hand gestures that function as human-computer interaction media in real time interaction mode. Based on testing also known a pretty good level of accuracy related to the basic function of interaction, namely: click (84.3%), doubleklick (81.4%), drag (87.6%)

AI0045 Presentation 16 (15:00-15:15)

Object Class Recognition using Combination of Colour Dense SIFT and Texture descriptors

Taha H. Rassem[1], Nasrin Makbol[2] and Bee Ee Khoo[2]

1. Universiti Malaysia Pahang, Malaysia; 2. Universiti Sains Malaysia, Malaysia

Abstract— Object class recognition has recently become one of the most popular research fields. This is due to its importance in many applications such as image classification, retrieval, indexing, and searching. The main aim of object class recognition is determining how to make computers understand and identify automatically which object or scene is being displayed on the image. Despite a lot of efforts that have been made, it still considered as one of the most challenging tasks, mainly due to inter-class variations and intra-class variations like occlusion, background clutter, viewpoint changes, pose, scale and illumination. Feature extraction is one of the important steps in any object class recognition system. Different image features are proposed in the literature review to increase categorisation accuracy such as appearance, texture, shape descriptors. In this paper, we propose to combine different descriptors which are dense colour scale-invariant feature transform (dense colour SIFT) as appearance descriptors with different texture descriptors. The colour completed local binary pattern (CCLBP) and completed local ternary pattern (CLTP) are integrated with dense colour SIFT due to the importance of the texture information in the image. Using different pattern sizes to extract the CLTP and CCLBP texture descriptors will help to find dense texture information from the image. Bag of features is also used in the proposed system with each descriptor while the late fusion strategy is used in the classification stage. The proposed system achieved high recognition accuracy rate when applied in some datasets, namely SUN-397, OT4N, OT8, and Event sport datasets, which accomplished 38.9%, 95.9%, 89.02%, and 88.167%, respectively.

![AICCC logo](www.aiccc.net)

2019 2nd Artificial Intelligence and Cloud Computing Conference

AI0039 Presentation 17 (15:15-15:30)

Autocalibration of Outlier Threshold with Autoencoder Mean Probability Score

Raphael Alampay and Patricia Abu
Ateneo de Manila University, Philippines

Abstract— Anomaly detection is a widely studied field in computer science with applications ranging from intrusion and fraud detection, medical diagnosis and quality assurance in manufacturing. The underlying premise is that an anomaly is an observation that doesn't conform to what is considered to be normal. A problem however is in defining the threshold that draws the line between what is normal and what is an anomaly which is largely dependent on a domain expert or from empirical testing that would yield the best result. Another problem is that the availability of data with regards to what is not normal is highly unavailable in real world scenarios making it difficult for traditional machine learning techniques to build a classification model. In this study, we propose a method that automatically determines the outlier threshold using a semi-supervised learning approach with autoencoders. To validate the performance of our proposed approach, we perform several experiments in comparison with traditional outlier detection approaches as well as an existing semi-supervised approach in one class classification, specifically OneClassSVM. The goal of this study is to eventually apply the method for autocalibration of anomaly detection of frames in video sequences. Initial results are also presented in a computer vision task.

AI0007 Presentation 18 (15:30-15:45)

Design of Fractional-Order PID Controller for Fractional-Order System via Flower Pollination Algorithm

Prapapan Khluabwannarat and Deacha Puangdownreong
Southeast Asia University, Thailand

Abstract: In system mofdeling, the fractional-order (FO) model can perform the system dynamic behavior with more accurate than the integer-order (IO) model. This paper proposes the optimal design of the fractional-order PID controller (or FOPID) for the fractional-order dynamic system by using the flower pollination algorithm (FPA), one of the most powerful metaheuristic optimizers. The FO-model of the brushless DC (BLDC) motor speed control system is conducted as a case study. Based on the modern optimization, the sum of squared error (SSE) between the referent speed and the actual speed of the BLDC motor speed controlled system is set as the objective function to be minimized by the FPA. Results obtained by the FOPID controller will be compared with those obtained by the IOPID controller. From simulation results, it was found that the FOPID controller optimized by the FPA for the fractional-order dynamic system (BLDC motor) can provide very satisfactory responses with faster and smoother than the IOPID controller in both tracking and regulating responses.

Coffee Break 15:45~16:00

Session 3 (16:00-18:15)

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

Afternoon, December 22, 2019 (Sunday)

Time: 16:00-18:15

Venue: Room C1-301, Engineering School, Kobe University, Japan

Session Chair: Prof. Tao Zhang

AD0005 Presentation 19 (16:00-16:15)

A Cross-Dataset Evaluation of Anti-Face-Spoofing Methods Using Random Forest and Convolutional Neural Network

Chin-Shyurng Fahn, Chu-Ping Lee and Meng-Luen Wu
National Taiwan University of Science and Technology, Taiwan

Abstract— Face recognition for authentication, namely unlocking by faces, is widely used in various access control applications, especially in mobile devices, and becomes one of major biometric authentication technology. Some existing authentication methods require additional depth sensors; however, they are still cheated by 2D or 3D printed faces sometimes. Although many researches aim at detecting fake faces, most of them only work well on specific situations, and they are unusable to master unseen spoofed scenarios.

Accordingly, in this paper, we propose face liveliness detection methods using a conventional camera, which is capable of effectively performing both intra- and cross-dataset detection on sets of real faces mixed with spoofed ones. We adopt local binary patterns (LBP) and 2D image distortion analysis (IDA) to extract texture information of face images, which are used for developing our face liveness detection system against spoofing attack to distinguish fake faces from real ones by a deep neural network (DNN). In addition to verifying whether the deep learning method induces over-fitting of spoofed faces using specific datasets, we also employ a random forest classifier to compare the face liveliness detection results. In intra-dataset evaluation, 10-fold cross-validation is adopted, and the accuracy of spoofed face detection is more than 97% using a convolutional neural network architecture. In cross-dataset evaluation, under the condition of the Idiap Replay-Attack Database acting as the training dataset as well as the NUAA Photograph Imposter Database serving as the testing dataset, the accuracy achieves 81.85% when using the scheme of combining LBP, IDA, and DNN techniques. Such performance is better than state-of-the-art methods.

AD0006 Presentation 20 (16:15-16:30)

Eye Semantic Segmentation Using Ensemble of Deep Convolutional Neural Networks

Watchanan Chantapakul, Linda Hansapinyo and Karn Patanukhom

Chiang Mai University, Thailand

Abstract— Eye semantic segmentation is a fundamental task in many works such as identication and medical applications. In this study, three encoder-decoder architectures using convolutional neural network are applied to segment the eyes. A simple encoder-decoder architecture is capable of generating only coarse segmentation results. On the other hand, _ne details like eyelashes can be achieved by U-net and SegNet architectures. However, they sometimes produce overall results worse than the simple one. To resolve this problem, we introduce a deep convolutional neural network-based ensemble technique for eye segmentation. The results from those architectures are combined in order to yield good results in both coarse-level and _ne-level segmentation. In the proposed technique, a trainable mask function is applied to achieve an optimal ensemble of coarse-level and _ne-level results. Our dataset comprises 64 eye images from di_erent environments, camera settings, people, and eye conditions. Experimental results show that our ensemble technique can improve the results from the conventional architectures. The proposed ensemble method manages to reach the average ac- curacy of 96.33% for three-class segmentation.

AI0030 Presentation 21 (16:30-16:45)

Improving Bees-based Imputation using Nearest Neighbor for Heuristic Function in Imputing Data

Kritanat Chungnoy[1], Aroonwan Suebsriwichai[1], Rachada Kongkachandra[1] and **Pokpong Songmuang**[1] and Ladawan Paisarnworrapatch[2]

1. Thammasat University, Thailand; 2. Planter Group Co., Ltd., Thailand

Abstract— Data imputation is a necessary task to solve missing value problem for better data mining result. The current data imputation with Bees algorithm contains several random procedures including instance selection and feature selection, and the randomness causes inconsistency and swinging result in iteration. Thus, this work proposes to solve them by applying a heuristic function in those procedures from using importance score in selecting attribute to handle and probability in selecting correlated value. These calculations provide the bees with a guidance direction; thus, there are less random processes and should lower inconsistent and swinging results from randomness. From evaluation, the proposed Bees-based imputation obtained higher accuracy than the previous Bees-based and Genetic algorithm-based imputation method from all data sets for all missing data percentage between 10% to 50%. The best improvement in accuracy for 23% in average was found in SPECT data set which consists of only binary type values. For the data sets with values mixing of binary and category type, the proposed method gained about 3-7% improvement in average.

AI0014 Presentation 22 (16:45-17:00)

A Deep Learning Model for Extracting Live Streaming Video Highlights using Audience Messages

Hung-Kuang Han, Yu-Chen Huang and Chien Chin Chen

National Taiwan University, Taiwan

Abstract— Live streaming has become a ubiquitous channel for people to learn new happenings. Although live streaming videos generally attract a large audience of watchers, their contents are long and contain relatively unexciting stretches of knowledge transmission. This observation has prompted artificial intelligence researchers to establish advanced models that automatically extract highlights from live streaming videos. Most streaming highlight extraction research has been based on visual analysis of video frames, and seldom have studies considered the messages posted by the viewer-audience. In this paper, we propose a deep learning model that examines the messages posted by streaming audiences. The video segments whose messages reveal audience excitement are extracted to compose the highlights of a streaming video. We evaluate our model in terms of multiple Twitch streaming channels. The precision of our highlight extraction model is 51.3% and is superior to several baseline methods.

AI0038-A Presentation 23 (17:00-17:15)

Personalities and Patterns of Twitch Chat in Let's Play Live Streams

Vera Paola Shoda

University of Tsukuba, Japan

Abstract— In the gaming community, there is a growing interest in Let's Play (LP) which refer to live streaming videos of gamers playing video games and interacting with their viewers through live chat. As LP's popularity continues to grow, new challenges and needs of LP content creators, LP content sharing platforms (Twitch, YouTube, etc.) and viewers are inevitable to occur. One of the challenges is the need for "personalized experience" of viewers. Popular method for creating "personalized experiences" that have been heavily studied are recommendation systems. However, there is little research on personalizing experience utilizing the live chat. Studying the live chat is significant since it is the mode of interaction between LP content creators and their viewers. The main contribution of this paper is that it proposes a novel method using text analysis, K-means clustering, and labeling for profiling viewers in the live chat. Using the proposed method, six personalities namely (1) Character Fans, (2) Game Informers, (3) Requesters / Suggestion Makers, (4) Questioners, (5) Positives, and (6) Negatives were identified. This result will open further research and improve understanding of how viewers interact with LP and their needs.

AI0043 Presentation 24 (17:15-17:30)

Model for Practice Badminton Basic Skills by using Motion Posture Detection from Video Posture Embedding and One-Shot Learning Technique

Nuttachot Promrit and Sajjaporn Waijanya

Silpakorn University, Thailand

Abstract— Badminton is a sport that is very popular in Asia for players of all gender and all ages. The practice of basic badminton skill such as badminton posture practice is essential because the correct posture help to avoid injury and help for improving player skill. In this article, we propose The Model for Practice Badminton Basic Skills. We have created the video posture embedding by using the Triplet-Loss technique and develop the badminton player's motion posture detection by using the One-Shot Learning technique. The motion posture detection consists 8 badminton's postures and 4 other postures instances 1) Forehand Clear 2) Backhand Clear 3) Forehand Drop Shot 4) Backhand Drop Shot 5) Forehand Smash 6) Backhand Smash 7) Forehand Serve 8) Backhand Serve 9) Raise the right hand 10) Raise the left hand 11) Stand/Walk and 12) Run. The performance of the model present the Precision is 0.85, Recall is 0.85, F-Measure is 0.84 and the Accuracy is 0.85.

AD0003-A Presentation 25 (17:30-17:45)

Nusantara Script Image Transliteration

Anastasia Rita Widiarti

Sanata Dharma University, Indonesia

Abstract— Indonesia has many ethnic groups, including Javanese, Sundanese, and Bataknese tribes. The diversity of the tribe is also reflected in the diversity of ways of writing manuscript in the past. Today most Indonesians people are not familiar with those manuscript. This paper presents the results of research for the automation of transliteration for Nusantara scripts image, i.e. Javanese, Sundanese and Bataknese script image. There are 3 main stages for transliteration. The first process in the preprocessing stage, there are process binarizationed, eliminated noise, equalized the size of the image to a size of 50x50, and thinned the script by Rosenfeld algorithm. In the feature extraction stage, each script are extracted by counted of sum black pixels in those script. The third process is a classification stage. We use K-NN algorithm with the number K set to 1, 3, 5, 7, and 9. Tests are carried out on the image data set of 2220 data. The best accuracy of script transliteration is 88.33%. With the 3-fold and 10-fold cross validation, the results show that there are differences of accuracy if the area of the extracted image, the number of neighbours in the classification and the number of data training is different.

AD0015 Presentation 26 (17:45-18:00)

Thai Handwritten Character Segmentation Based on Deep Learning

Kunnapat Thipparaphonkul, Watchanan Chantapakul, Chayanin Suatap and Karn Patanukhom

Chiang Mai University, Thailand

Abstract— Many computer vision applications rely on segmentation task. To achieve a good result on Handwritten text recognition(HTR), character segmentation is significant in terms of extracting each individual character. In this study, we propose a novel algorithm for tackling offline handwritten character segmentation, particularly for the Thai language. Not only are the characteristics of the Thai language described, but also the problems when performing Thai character segmentation are defined. There are two parts of segmentation: horizontal link segmentation and vertical link segmentation. The chosen type of algorithm is convolutional encoder-decoder network. Our models are based on the renowned encoder-decoder models, U-net and SegNet. The best horizontal link segmentation model achieves up to 0.929 F1-score on the real-world test set. For the vertical link segmentation, the best models of topmost, upper, base, and lower characters attains F1-scores of 0.799, 0.873, 0.932, and 0.820, respectively.

AI0044 Presentation 27 (18:00-18:15)

Image Analysis of Mushroom Types Classification by Convolution Neural Networks

Orawan Chaowalit[1], **Jitdumrong Preechasuk**[1], Fuangfar Pensiri[2] and Porawat Visutsak[3]

1. Silpakorn University, Thailand; 2. Suan Dusit University, Thailand; 3. King Mongkut's University of Technology North Bangkok, Thailand

Abstract— Food poisoning is caused of intake of food that contaminates toxic substance and it will lead to illness and death. One of major reasons caused of food poisoning is eating poisonous mushrooms. The main reason of eating poisonous mushroom is lack of knowledge and lack of skill to classify the edible and poisonous mushroom. Besides, physical characteristics of both types are high similarity; young mushrooms which cannot be classified its type by naked eyes. Therefore, the research focuses on classifying two types including edible and poisonous mushrooms and it can reduce the number of illness persons and reduce loss of life due to eating poisonous mushrooms.

The research proposes a new method of classifying two types including edible and poisonous mushroom by a technique of Convolution Neural Network. The proposed method was tested on both types of mushroom composed of 46 edible types and 14 poisonous types of mushroom. The proposed method was trained with 8,195 images and tested with 361 images to classify both types of mushroom. For experimental result, the proposed method can classify both types of mushroom image with 90.80 of accuracy. It concluded that the proposed method can classify two types of mushroom image with efficiently.

Session 4 (16:00-18:15)

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

Afternoon, December 22, 2019 (Sunday)

Time: 16:00-18:15

Venue: Room C2-301, Engineering School, Kobe University, Japan

Session Chair: Prof. Chiharu Ishii

AI0006 Presentation 28 (16:00-16:15)

Design of State-Feedback Controller for Vehicle Suspension System via Intensified Current Search

Wattanawong Romsai and Auttarat Nawikavatan
Southeast Asia University, Thailand

Abstract— The vehicle suspension is one of the most important mechatronic systems of which the purpose is to improve the ride comfort and road handling. This paper proposes the optimal design of state-feedback controller for the passive vehicle suspension system by using the intensified current search (ICuS) based on modern optimization context. The ICuS is one of the most powerful trajectory-based metaheuristic optimization techniques. In this paper, the considered passive vehicle suspension controlled system will be tested against five different road profiles. The responses of the passive vehicle suspension system controlled by the state-feedback controller optimized by the ICuS will be compared with those designed by the Ackermann's formula. As results, it was found that the ICuS can successfully design optimal state-feedback controller for the passive vehicle suspension system superior to the Ackermann's formula. The state-feedback controller designed by the ICuS provides very satisfactory responses with smaller overshoot, shorter settling time and without steady-state error.

AI0012 Presentation 29 (16:15-16:30)

Hybrid Monitoring of Surface Roughness and Straightness in CNC Turning of Aluminium using Neural Network Approach

Somkiat Tangjitsitcharoen

Chulalongkorn University, Thailand

Abstract— The relations of the surface roughness, the straightness and the cutting conditions are investigated to realize an intelligent CNC machine by monitoring the in-process cutting forces during CNC turning of aluminium 6063 with the use of coated carbide tools. The cutting force is proposed to predict the straightness and surface roughness. The Fast Fourier Transform (FFT) is used to prove the relations of them by checking the frequencies of them. The cutting force ratio is proposed and normalized to predict the in-process surface roughness and straightness regardless of the cutting conditions. The surface roughness and the straightness are calculated simultaneously by employing the two-layer feed-forward neural network with sigmoid hidden and linear output neurons. The neural network is trained by using the Levenberg-Marquardt back propagation algorithm. It is understood that the surface roughness and the straightness can be estimated well by utilizing the proposed method under various cutting conditions.

AI0018 Presentation 30 (16:30-16:45)

Preliminary Study of Factors Affecting the Spread and Resistance of Consumers' Use of AI Customer Service

Yu-Kai Huang[1], **Cheng-Hsien Hsieh**[2], Connie Chang[3], Wu Li[4] and Wei-Shang Fan[1]

1. Nanhua University, Taiwan; 2. Singapore University of Social Sciences, Singapore; 3. Musashino University, Japan; 4. Shanghai Jiao Tong University, China

Abstract— Based on the stimulus-organism-response model, this paper constructs an extended version of the technology acceptance model and is targeted at university students. In addition to analyzing the factors which affect consumers' use of AI customer service, the factor analysis technique is also used to explore and understand the factors that play a key role in consumer behaviors under different shopping situations. Research has found that consumers use AI customer service mainly because they can save waiting time and solve problems effectively. Therefore, it is suggested that the dealers can use the two-way interactive conversation system, which covers natural language understanding, in-depth learning and emotion recognition technology to truly understand users' communicated semantics. Furthermore, they should use feedback data to improve the accuracy and service effectiveness of AI customer service responses. Through the human-machine cooperation approach and the integrated platform that provides multi-channel communication, this will further solve the problem of AI customer service not able to respond effectively to consumers. In addition, the dealer must provide different assistance according to the different attributes of these innovative adapters, for example, using the customer's browsing history, behavioral habits, and other required materials in order to conduct in-depth learning. This way they can accurately establish user portrait graph spectrum so as to provide more personalized services.

AI0020 Presentation 31 (16:45-17:00)

End-to-End Xception Model Implementation on Carla Self Driving Car in Moderate Dense Environment

Willy Dharmawan and Hidetaka Nambo,

Kanazawa University, Japan

Abstract— Recently, with hardware limitation, many autonomous car developers using a simulator to test their network model or solve some self-driving car issues. With that in mind, Carla simulator provides an open platform with many different varieties of maps and real environment parameter, which indicate multiple challenges to be accomplished. There are many approaches to solve these problems, ranging from a complex model such as imitation learning followed by inverse reinforcement learning to a simple model adopting spatial or time-based network with performance-based oriented putting computational time aside. Pertaining this matter, we look into a light-weight model for spatial classification which can reduce computational time with a slight trade back.

Mapping cross-channel correlations and spatial correlations in the feature maps separately in extreme Inception, or Xception has outperformed inception v3 slightly on the Imagenet dataset. Moreover, it has the same number of model parameters as inception, which implies a greater computational efficiency.

While, on the recent work, Nvidia model or Pilotnet, a CNN based model, has successfully tested their design to map images into control parameter value on the autonomous car system. Therefore, this development motivates us to use the Xception model in the self-driving car context using Carla simulator. In the test simulation, Xception model can work well, reaching the designated destination. It also display a better steering score in comparison to Nvidia model in the best form.

AI0028 Presentation 32 (17:00-17:15)

Artificial Intelligence in Conversational Agents: A Study of Factors Related to Perceived Humanness in Chatbots

Nina Svenningsson and Montathar Faraon

Kristianstad University, Sweden

Abstract— Artificial intelligence (AI) is gaining traction in service-oriented businesses by means of chatbots. Chatbots are a popular form of social AI that uses natural language processing (NLP) to communicate with users. Past studies have shown discrepancies on whether a chatbot should communicate and act like a human or not. This article aims to explore this discrepancy in order to provide a theoretical contribution of factors related to perceived humanness in chatbots and how these may consequently lead to a positive user experience. The results suggest that a chatbot should be given the following characteristics: avoiding small talk and maintaining a formal tone; identifying itself as a bot and how it could help; providing specific information and articulating itself with sophisticated choice of words and well-constructed long sentence structure; asking follow-up questions in decision-making processes and; providing an apology when context is not comprehensible followed by a question or a statement to dynamically move a conversation forward. These results may have practical implications for designers working in the field of AI as well as for the wider debates and broader discourses around the adoption of AI in society.

AI0009 Presentation 33 (17:15-17:30)

Fractional-Order PID Controller Design Optimization for Load Frequency Control via Flower Pollination Algorithm

Thitipong Niyomsat and Deacha Puangdownreong

Southeast Asia University, Thailand

Abstract— This paper presents a design of an optimal fractional-order PID (FOPID) controller for the load frequency control (LFC) in power systems. Based on the modern optimization, the flower pollination algorithm (FPA) is utilized by searching for the appropriate values of the FOPID parameters for the given LFC in the single area power system. To perform its effectiveness, the FOPID controllers optimized by the FPA are tested against three different turbines in power systems, i.e. non-reheated, reheated and hydro turbines. Results obtained by the FOPID will be compared with those obtained by the conventional integer-order PID (IOPID) controller. As results, it was found that both IOPID and FOPID controllers designed by the FPA can improve the damping of the power system responses. However, the FOPID controller shows superior results to the IOPID by giving very satisfactory responses with less damping and faster recovering for all cases.

AI0046-A Presentation 34 (17:30-17:45)

Deep Learning for Cancer Prognosis from Multi-Omics and Clinical Features

John Zhong

University of Southern California, United States

Abstract: Accurate prognosis of patients with cancer is important for the stratification of patients, the optimization of treatment strategies, and the design of clinical trials. To harness the rich information in multi-omics data, we developed GDP (Group lass regularized Deep learning for cancer Prognosis), a computational tool for survival prediction using both clinical and multi-omics data. GDP integrated a deep learning framework and Cox proportional hazard model (CPH) together, and applied group lasso regularization to incorporate gene-level group prior knowledge into the model training process. We evaluated its performance in both simulated and real data from The Cancer Genome Atlas (TCGA) project. Compared to the standard lasso regularization, we showed that group lasso achieved higher prediction accuracy when the group prior knowledge was provided. We also found that GDP performed better than CPH for complex survival data. Furthermore, analysis on real data demonstrated that GDP performed favorably against other methods in several cancers with largescale omics data sets, such as glioblastoma multiforme, kidney renal clear cell carcinoma, and bladder urothelial carcinoma. In summary, we demonstrated that GDP is a powerful tool for prognosis of patients with cancer, especially when large-scale molecular features are available.

AI0032 Presentation 35 (17:45-18:00)

Performance Evaluation of CAESAR Authenticated Encryption on SROS2

Shu Takemoto[1], Kanata Nishida[1], Yusuke Nozaki[1], Masaya Yoshikawa[1], Shinya Honda[2] and Ryo Kurachi[2]

1. Meijo University, Japan; 2. Nagoya University, Japan

Abstract: With the expansion of Industry 4.0, the factory automation (FA) system has become more complex due to wireless communication between multiple devices. Therefore, short-term development and secure communication are required for development cost and cyber-security issues. For this reason, secure robot operating system 2 (SROS2) was developed. SROS2 is an open-source platform applicable to industrial robots. SROS2 achieves short-term development with various libraries and implements encryption and authentication by embedding advanced encryption standard - Galois/counter mode (AES-GCM). On the other hand, AES-GCM has been reported to be vulnerable to spoofing. To ensure the security of SROS2, other encryption algorithms should be introduced instead of AES-GCM. In addition, the system must be able to operate without problems after replacement. For these reasons, this study embeds secure authenticated encryption instead of AES-GCM in SROS2. The results of an evaluation experiment on the latency of the encryption algorithm showed that Ascon is more effective than AES-GCM.

AI0031 Presentation 36 (18:00-18:15)

Implementing a Semantic-based IoT Mashup Service

Hyunseung Seok, Sunghyun Nam and Yongju Lee

Kyungpook National University, South Korea

Abstract— The semantic information provided through the semantic-based IoT system will produce new high value-added products that are completely different from what we have known and experienced. From this point of view, a key issue of current IoT technology and applications is the development of an intelligent IoT platform architecture. Our proposed system collects the IoT data of the sensors from the cloud computer, converts them into RDF, and annotates them with semantics. The converted semantic data are shared and utilized through the ontology repository. We use KT's IoTMakers as a cloud computing environment, and the ontology repository uses Jena's Fuseki server to express SPARQL query results on the Web using Daum Map API and HighCharts API. This gives people the opportunity to access the semantic IoT mash-up service easily and has various application possibilities.

Dinner 18:30-19:30

Poster session

Afternoon, December 22, 2019 (Sunday)

Time: 10:30-12:35

Venue: Kobe University, Japan-Engineering School, Room C2-301

Session Chair: Prof. Kenji Suzuki

AI0034 Poster 1

Creating English Learning Environment via Using Social Networks and Some Supporting Information Technology Tools

Hoi Huynh Tan
FPT UNIVERSITY, Viet Nam

Abstract— This paper aims to use social networking and some information technology tools to support English teaching in order to improve students 'foreign language skills as well as their motivation outside of school time. The paper also addresses the self-study element of students based on the support of modern scientific and technological equipment today. Since then, the interest in improving the teaching and learning process towards the application of software is quite necessary.

AI0041 Poster 2

The Elements Extraction on Traditional Chinese Paintings Based on Object Detection

Qingyu Meng, Kaiyue Li, Mingquan Zhou and Huanhuan Zhang
Beijing Normal University, China

Abstract— The traditional Chinese painting has great cultural and historic value for us. Because of that, the research on the paintings has never stopped. During the current research stage, we would like to design a system which can rapidly construct a 3D scene according to a traditional Chinese painting. In the previous article [1], we designed a convolutional neural network referenced to VGG-16 [2] to classify traditional Chinese paintings into figure painting, landscape painting, and flower-and-bird painting according to the content of the paintings. However, it is not enough to be able to classify a painting. If we can quickly extract the main elements of a painting, it will greatly facilitate the construction of a 3D scene. To this end, we have studied the object detection algorithm based on deep learning which achieves amazing accuracy on a natural image dataset and tried to migrate it to the traditional Chinese painting dataset. Considering that our construction system may be applied on the mobile side like a smartphone, we used two algorithms which are faster and less computationally intensive: YOLOv3 and RetinaNet. According to the characteristics of traditional Chinese painting dataset, the network structure and some hyper-parameters were modified. Finally, we experimentally proved the effectiveness of such algorithms in the traditional Chinese painting application scenarios.

AI0017 Poster 3

Combinatorial Testing Approach For Cloud Mobility Service

Behailu Getachew Wolde[1] and Abiot Sinamo Boltena[2]

1. University of Oldenburg, Germany; 2. Mekelle University, Ethiopia

Abstract— Currently, software product becomes an essen-tial component in running many stakeholders' activities. For instance, the industries mostly use cloud services to execute their important business functionality. However, by a few input's parameter interacting, this functionality can be pended. Such constraint poses challenging to cover various features of failure especially in ensuring cloud application. One way is to devise a strategy to cover input parameters' characteristics based on combinatorial testing approach. This technique includes all possible combinations of test inputs for detecting bugs on the System Under Test (SUT). The paper explains the combinatorial covering arrays to generate relatively exhaustive testing by modeling features of sample services using Feature IDE plugin in Eclipse IDE. This way, we build the input domain model to represent coverage of the existing mobility service running on NEMo Mobility cloud platform. Using this model, covering arrays is applied to generate t-way test cases by leveraging IPOg algorithm, which is implemented in a CiTLab. As a test case management, the JUnit testing framework uses test stubs to validate the test methods of generated test cases on the specified service (SUT).

One Day Visit

(December 23, 9:00~16:00)

December 23, 2019 (Monday) 9:00~16:00

The exact tour route will be adjusted according to the situation on December 23, 2019

1. Morning (9:30-12:00)

Ikuta Shrine

Ikuta Shrine is a famous shrine that appeared in the "Japanese Secretary" and "Pillow Grass". It is located in the urban area of Kobe and has been wrapped in modern architecture, but there is also a small garden in the shrine, which makes the landscape contrast with the surrounding. The Ikuta Shrine enshrines the goddess of the sun, and the prayers for the marriage and health of the family have worked.

2. Lunch (12: 00-13:00)

3. Half Day Tour (13: 00-16:00)

Rokkosan Farm

Rokkosan Farm is located on the Rokkosan Mountain in the northern suburbs of Kobe. There are various livestock such as cows and goats in the pastures on the west side of Rokkosan Mountain. In the pasture, the flowers in the past season are full of flowers, and the idyllic pastoral songs are floating.

Note

Note