

The 18th Hosei University IIST Colloquium

Public Hearing of IIST Master Thesis 2020

第 18 回 法政大学 IIST コロキウム
IIST 生修士論文公聴会

This colloquium is planned as the public hearing of master thesis of IIST students scheduled to graduate in September, 2020. Ten international students from China, Vietnam, Bangladesh will present their research outcome. Those who wish to attend the colloquium are advised to contact the organizer Prof. Kazuo Yana via e-mail (yana<at>hosei.ac.jp.) Invitation with access information will be sent.

Date and Time: 13:20-17:00 July 10th, 2020

日時: 2020 年 7 月 10 日 (金) 13:20-17:00

Venue: Online Zoom Meeting Room

Meeting URL will be provided three hours prior to the opening time

会場: Zoom による遠隔開催

Email us to be invited to the online meeting. Address: yana<at>hosei.ac.jp

HOSTS

IIST: Hosei University Institute of Integrated Science and Technology Hosei
University Global Education Center

主催: 法政大学 IIST (総合理工学インスティテュート)

共催: 法政大学グローバル教育センター



PROGRAM

13:20-13:25 OPENING MESSAGE

Professor Koichi Wada

SESSION 1

Chair: Professor Kazuo Yana, Director of IIST

Master Students of Applied Informatics Major

13:25-13:45 SUN Mingdi

A Bakanae Disease Detection System Based on Improved Faster-RCNN

13:45-14:05 DAIF Hassan Mohamed Mahmoud

AraDIC: Arabic Document Classification Using Image-Based Character Embeddings and Class-Balanced Loss

14:05-14:25 XU Jiayao

Research on High-Speed Image Reconstruction Based on Compressed Sensing

14:25-14:45 HO MINH Man

Research on Self-supervised Learning for Image/Video Compression

14:45-15:05 TRINH Man Hoang

Compression enhancement using learning-based approach and additional information

15:05-15:15 INTERMISSION

SESSION 2

Chair: Professor Jinjia Zhou, Co-director of IIST

Part 1: Master Students of Applied Informatics Major

15:15-15:35 ZHANG Xuefei

An Evaluation Scheme for the Quality of Reviews

15:35-15:55 HOSSAIN Md Shafayat

An Analysis on Email Classification by Using Topic Modeling

*Part 2: Master Students of Systems Engineering Major
(Management Science Track)*

15:55-16:15 LI Ye

Error analysis of stochastic optimal control problem with
deep fictitious play

16:15-16:35 CUI Yang

Forecasting GDP based on the Mixed Frequency Data Model

16:35-16:55 LI Yanyu

Portfolio insurance strategies under volatile market

16:55-17:00 CONCLUDING REMARKS

Professor Tatsuyoshi Miyakoshi

ABSTRACT and Bio-sketch of Speakers

13:25-13:45 SUN Mingdi

Title: A Bakanae Disease Detection System Based on Improved Faster-RCNN

Abstract: The detection of Bakane disease is of great significance to intelligent agriculture and to increase rice yield. In order to detect Bakanae disease quickly and accurately, the author improved the original classical object detection network Faster-RCNN. Although some previous researches have already indicated that the traditional Faster-RCNN could be improved by using FPN, in order to provide some further improvements, the author combines FPN with Deformation Convolution and Channel Attention in the present study. In addition, as the lack of sample data, the original training set was augmented to improve the results. The two improvements have greatly improved the learning ability of the network, which is particularly important for the detection of irregularly shaped and undefined targets in rice. In a word, the author designed a strong and reliable network for the Bakanae disease detection and actually tested it.



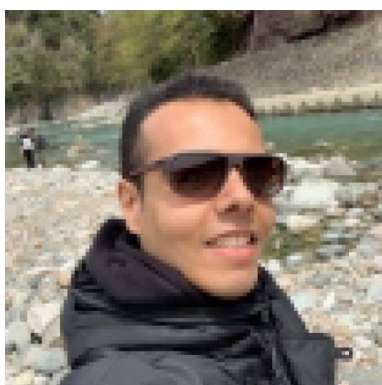
Sun Mingdi received her Bachelor Degree (Eng.) from the Department of Measurement and Control Technology and Instrument, Northeast Electric Power University, China, in 2017. She used to be an exchange student at National Yunlin University of Science and Technology, Taiwan, during 2015. Currently, she is an IIST master student in the Graduate School of Science and Engineering, Hosei University. Her research interest is the application of Deep Learning and Object Detection to agricultural productivity improvement. She is designing a diagnosis system which could help farmers with the issues in disease prevention and productivity improvement

13:45-14:05 DAIF Hassan Mohamed Mahmoud

Title: AraDIC: Arabic Document Classification Using Image-Based Character Embeddings and Class-Balanced Loss

Abstract: Classical and some deep learning techniques for Arabic text classification often depend on complex morphological analysis, word segmentation, and hand-crafted feature engineering. These could be eliminated by using character-level features. We propose a novel end-to-end Arabic document classification framework, Arabic document

image-based classifier (AraDIC), inspired by the work on image-based character embeddings. AraDIC consists of an image-based character encoder and a classifier. They are trained in an end-to-end fashion using the class balanced loss to deal with the long-tailed data distribution problem. To evaluate the effectiveness of AraDIC, we created and published two datasets, the Arabic Wikipedia title (AWT) dataset and the Arabic poetry (AraP) dataset. To the best of our knowledge, this is the first image-based character embedding framework addressing the problem of Arabic text classification. We also present the first deep learning-based text classifier widely evaluated on modern standard Arabic, colloquial Arabic and classical Arabic. AraDIC shows performance improvement over classical and deep learning baselines by 12.29% and 23.05% for the micro and macro F-score, respectively.



Mahmoud Daif received the B.S degree Cairo University, Faculty of Engineering, Computer Engineering Department, 2013, Cairo Egypt. He worked for 4 years as a data scientist and a machine learning engineer after graduation. Then he decided to join the Japan Foundation to learn more about Japanese language and culture. After that he decided to come to Japan to continue his studies and do a masters degree. He was awarded the ABE initiative scholarship and he chose Hoese University as his destination.. His current research is Deep Learning applied to the Natural Language Processing domain. He is designing an Arabic document classification framework that could be used to address some of the challenges associated with Arabic text classification. His ultimate goal is to use Natural Language Processing to automate many of the tasks that involve a lot of routine work to help people focus on more creative tasks and increase productivity

14:05-14:25 XU Jiayao

Title: Research on High-Speed Image Reconstruction Based on Compressed Sensing

Abstract: Compressed sensing (CS), as a signal processing technique, is often used to acquire and reconstruct a sparse signal. It can decrease the difficulty of acquiring signal while increase the difficulty of reconstructing the signal. Recently, block-based intra prediction algorithms are widely used to further increase the compression ratio of images by using the information of neighboring blocks to predict the current block. Meanwhile, the reconstruction of compressed sensing images is time consuming, and it is hard to increase the speed by parallel processing due to the dependency among the blocks. A

reconstruction algorithm using Zigzag ordering-based parallelism is proposed in this paper to solve this problem. Besides, based on the feature of the chosen sensing matrix, a new method with higher efficiency for choosing the first candidate list in the reconstruction procedure was presented in this paper. The experimental results demonstrated that the proposed algorithm speedups the baseline algorithm for 3.26 to 7.13 times. Thus, it is a promising solution for fast reconstruction of compressed images



Jiayao Xu is currently a master student of IIST program in Graduate School of Science and Engineering, Hosei University, Japan. Before studying in Hosei University, she received her B.S. in Computer Science from Southwest University of Science and Technology in 2018. She was an iOS developer in Laboratory of Mobile Internet from 2015 to 2017. Her current research interest is image reconstruction based on the Compressed Sensing.

14:25-14:45 HO MINH Man

Title: Research on Self-supervised Learning for Image/Video Compression

Abstract: Integrating deep learning techniques into the video coding framework gains significant improvement compared to the standard compression techniques, especially, self-supervised learning approaches such as Super-Resolution, Colorization. In this work, we reduce the bit-rate significantly by removing pixels (down-sampling) and color information. It creates a new challenge in compensating for the massively missing information through down-sampling, color removal, and compression. Adopting advanced techniques in computer vision, we propose a specific deep neural network, named restoration-reconstruction deep neural network (RR-DnCNN), to solve Super-Resolution with compression degradation. Furthermore, we also introduce a scheme to compensate for color information with Color Learning and enhance image quality with Deep Motion Compensation for P-frame coding. As a result, our works outperform the standard codec such as H.265/HEVC, and the previous works in the field. Furthermore, our work achieves the world's top 5 performance on P-frame track Challenge on Learned Image Compression (CLIC) 2020.



Man M. Ho received his B.S. degree in Computer Science from Vietnam National University, University of Information Technology, Vietnam, in 2017. After graduation, he worked at EyeQ Tech, Vietnam as a Machine Learning Engineer during 2017-2018 and was recognized as a Key Contributor. Currently, he is a master student and also a member of the Intelligent Media Processing Lab (IMPLab) at Hosei University, Tokyo, Japan. His interests lie in Computer Vision, Deep Learning, Graphics, and Photography. He has received the Best Paper Runner-up Award at MMM2020. <https://minhmanho.github.io/>

14:45-15:05 TRINH Man Hoang

Title: Compression enhancement using learning-based approach and additional information.

Abstract: Recently, learning-based methods have been well known for their efficiency in the multimedia enhancement task. In this work, we studied the ability of learning-based methods in the compression enhancement. In detail, a special design of Recursive Residual Neural network (RRN) is applied to enhance the conventional HEVC video codec – B-DRRN, a layered image compression uses our SMapNet for the semantic segment enhancement - EDMS and a hybrid video codec uses self-enhancement and multi-frames enhancement. We also conduct a new large-scale dataset with 209,152 training samples. Experimental results show that the proposed B-DRRN and the hybrid codec can reduce up to 6.16% and 51% BD-rate compares to HEVC and x265, respectively. Whereas, the proposed EDMS can get 5% bitrate, and 24% encoding time saving compare to the state-of-the-art semantic-based image codec.



Trinh Man Hoang received the B.S degree from the University of Information Technology, Vietnam National University, Ho Chi Minh City, Viet Nam in 2018. He was a SAKURA Science student and came to Hosei University in February 2018. After that program, he decided to come back and continue to study at Hosei. Currently, he is an IIST master student of Graduate School of Science & Engineering in Hosei University, Koganei Campus. His current research is

Deep Learning, Multimedia Processing and apply it to enhance the performance of multimedia compression. He's designing an end-to-end learning-based enhancement framework which can be applied into any compression codec.

15:15-15:35 ZHANG Xuefei

Title: An Evaluation Scheme for the Quality of Reviews

Abstract: In recent years, with the development of e-commerce, people have paid more attention to the research of product reviews. The high-quality of the reviews can provide sufficient information to help customers choose the products. In this paper, we built an evaluation scheme for the quality of reviews base on machine learning. The dataset was obtained by the crawler and labeled through manual annotation. We vectorize the reviews by TFIDF for the SVM model as the basic algorithm. The sentiment lexicon is one of the sentiment analysis methods, which can give a score as the sentiment feature. We compared SENTIWORDNET, AFINN, VADER three different sentiment lexicons and chose the best lexicon—VADER to get the sentiment score to improve the model. The Self-training which is a semi-supervised learning method combined with the unlabeled dataset was built based on the SVM model. We also built the LSTM neural network with word embedding of GloVe and improved it by virtual adversarial training method. The result shows that the virtual adversarial training model worked better in the evaluation scheme for the quality of reviews.



ZHANG XUEFEI received the bachelor's degree from the University of Beijing Information Science and Technology University, China in 2015. After graduation, he worked as an assistant for three years. Then he decided to come to Hosei University and continue to further study in 2018. Now, he is an IIST master student of Graduate School of Science & Engineering in Hosei University, Koganei Campus. His current research is Machine Learning, Natural Language Processing and applied it for the quality of reviews. He is building an evaluation scheme that can help customers get high-quality reviews.

15:35-15:55 HOSSAIN Md Shafayat

Title: An Analysis on Email Classification by Using Topic Modeling

Abstract: Email communication has been increased over the years significantly. Government agencies, corporate houses, multinational industries, banking, academic institutions almost every aspects of our daily necessities, we are communicating through emails. To organize this large amount of email trafficking, email classification is getting more focus day by day. Email Classification is a broad term. It might be used as separating spam email, detecting phishing email, detecting threat email and many other aspects. There are lot of paper has been published on these topics over the year. This paper is focusing on classifying email into different categories by using topic modeling technique. For that, the email body will be analyzed to categorize emails from the scratch. In topic modeling, documents are considered as collection of topics and topics are considered as collection of words also known as bag of words. We used Latent Dirichlet Allocation also known as LDA to extract topics from email dataset. We used enron email dataset for our experiment which is the largest open source email dataset. Expected outcome will be human interpretable topics which can easily be identified and categorized by labeling them.



Md Shafayat Hossain received the BCSE degree from the International University of Business Agriculture and Technology, Dhaka, Bangladesh in 2014. After that he worked for two reputed software farms in Bangladesh as a software developer. In April 2016 he came to Japan for higher studies. Initially, he spent one and half year for learning Japanese Language in a Japanese Language School. Later, he came to visit Hosei University in March 2018. After that, he decided to admit here and continue to study at Hosei. Now, he is an IIST master student of Graduate School of Science & Engineering in Hosei University, Koganei Campus. His current research is based on Natural Language Processing, Information Retrieval Process and applied it for classifying and labeling large email dataset. He is working on Enron email dataset which is consist of half millions email data and the biggest open source email dataset for performing experiment.

15:55-16:15 LI Ye

Title: Error analysis of stochastic optimal control problem with deep fictitious play

Abstract: In stochastic differential game, one of the core targets is to find Nash equilibrium. In this paper, we approximate Forward-Backward Stochastic Differential Equation to find Nash equilibrium numerically in a time-discrete way based on a learning process space(strategy) called deep fictitious play. Our stochastic optimal control is based on Linear-Quadratic model (linear dynamics, quadratic costs). Under appropriate assumption, we approximate cost function, dynamic system, backward stochastic differential equation in strong convergence so as to analysis the error. Meanwhile, we suggest the upper-bound of time interval and lower-bound of iteration stage so as to provide available parameters in the future work.



Ye LI received the Bachelor Degree of Statistics from the BTBU, School of Mathematics & Statistics in 2013. During the time before Hosei, he was an employee at Horizon-China a few years as data-analyst. Now, he is an IIST master student of System Engineering & Science. His current research is error analysis, control and stochastic game (probabilistic approach based). His supervisor is Kazuhiro YASUDA working in Mathematical finance lab.

16:15-16:35 CUI Yang

Title: Forecasting GDP based on the Mixed Frequency Data Model

Abstract: One of the most anticipated data releases of the Japan statistical system is the quarterly real gross domestic product (GDP). Official publication of this statistic, however, comes at a significant delay of up to months. This study aims to demonstrate the nowcasting to predict of the present, the very near future, and the very recent past based on the information provided in the form of monthly, weekly, daily, etc... The dimension reduction with the PCA (principle component analysis) method, reduce the 19 economic variables into 10 PCA factor. We apply the MIDAS (Mixed Data Sampling) regression to solve the mixed frequency problem, and the ARDL model as the benchmark. The result indicates the MIDAS framework in accurately predicting the GDP using information from high frequency economic indicators perform better than the classical one (sample time average method with the ARDL model).



Yang CUI received the B.S degree from the Shanghai Ocean University, Shanghai City, China in 2017. She decided to enrich her research ability after one year data analysis working experience. Now, she is an IIST master student of Graduate School of Science & Engineering in Hosei University, Koganei Campus. Her current research is time series analysis, deep learning and applied it to predict the GDP and other index

16:35-16:55 LI Yanyu

Title: Portfolio insurance strategies under volatile market

Abstract: Portfolio insurance strategies are designed to enable investors to limit downside risk while at the same time to gain profits from rising market. Among that, constant proportion portfolio insurance strategy (CPPI) and option-based portfolio insurance strategy (OBPI) are two typical models in portfolio insurance strategies. With the popularity of the portfolio insurance strategies, portfolio optimization problem receives plenty of publicity. It depends on the risk profile of the investor. Each investor has their own preference for return and risk, investment activities should follow a utility function of return and risk. Therefore, portfolio optimization problem can be modeled by utility maximizer. It is well-known that in the Black / Scholes model, these strategies can be implemented as the optimal solution by forcing an exogenously given guarantee to maximize the expected utility of investors with constant relative risk aversion (CRRA) function. In this research, we combine CRRA utility maximization with the stylized strategies and bring these results together. In particular, we focus on the volatile market and consider the market is under the Constant Elasticity of Variance (CEV) model. In addition, we discuss the advantages and disadvantages of CPPI and OBPI strategies under the distribution of optimal payoffs and utility value in CEV model.



LI YANYU received the B.B.A degree from the University of Accounting, Shandong Technology and Business University, Yantai City, CHINA in 2017. At college, she was really interested in finance. After graduation, she decided to learn something about finance. Now, she is an IIST master 2 student of Graduate School of Science & Engineering in Hosei University, Koganei Campus. Her current research is about portfolio insurance strategies

under volatile market. She's trying to compare and discuss some advantages and disadvantages of portfolio insurance strategies in volatile market.