

JAIST and PTIT: AI Summer School 2024

Hanoi, Vietnam, July 24-27, 2014

Location: 96A Tran Phu, Mo Lao, Ha Dong, Hanoi, Vietnam

School Day 1 - July 24	
8:00 – 8:30	Registration
8:30 - 8:45	Opening Remarks from PTIT and Summer School Organizer
8:45 – 10:15	<p>Title: Large Language Models for NLP applications and beyond Speaker: Prof. Nguyen Le Minh (JAIST)</p> <p>Abstract: Large language model families, including ChatGPT, demonstrate high performance and have made significant breakthroughs in real-world applications. In this talk, we would like to highlight the core technology used to build large language models and discuss the growing trend of utilizing these models in various NLP applications. Furthermore, we will delve into the potential issues associated with using such models, focusing on topics like bias, security, and privacy. In the final part of my talk, we will showcase our current deep learning-based techniques for analyzing legal documents. Additionally, we will discuss our system's exceptional performance in the Competition on Legal Information Extraction/Entailment, where we achieved outstanding results.</p> <p>Biodata</p> <p>Minh Le Nguyen received a B.Sc. degree in computer science from Hanoi National University, Hanoi, Vietnam, in 1998, a master's degree from the College of Technology, Vietnam National University, Hanoi, in 2001, and a Ph.D. degree in information science from the Graduate School of Information Science, JAIST, Ishikawa, Japan, in 2004. He is currently working as a professor at the Graduate School of Information Science, JAIST. He is also a director of the Interpretable AI Center at JAIST. His research interests include machine learning, deep learning, text summarization, machine translation, natural language understanding, legal engineering, and grammatical analysis of music. He serves as an Editorial Board member of Artificial Intelligence and Law and TACL - Transactions of the Association for Computational Linguistics. He is a steering committee member of JURISIN in Japan, and he is also the general chair of the KSE conference series</p>
10:15 - 10:30	Coffee Break

<p>10:30 - 12:00</p>	<p>Title: Control flow graph similarity in analyzing malware Speaker: Prof Mizuhito Ogawa (JAIST)</p> <p>Abstract: Machine learning is extensively used and successful in malware detection and classification. However, it has been pointed out that "aging" and/or "concept drift" lead to deterioration in precision. As malware techniques evolve, manually set features quickly lose focus on the targets. It is said that nearly 100% precision drops to less than 80% or even 60% in several months. To continue learning and updating the features, a lot of human effort is required. Instead, we observe more semantic features, control flow, and data flow, which reflect the structure of codes. However, under the presence of obfuscations (often introduced automatically by packers, which are used in more than 85% of malware), it is not easy to obtain precise control flow graphs (CFGs) of malware. Our solution to analyze CFGs is dynamic symbolic execution, which is believed to be the most powerful deobfuscation. We developed BE-PUM for x86/Windows with HCMUT and LQDTU and HybridSE for ARM/Android at JAIST. After obtaining CFGs of malware in the wild, we apply W-L graph kernel-based similarity analyses for malware classification and packer identification. The experiments show that the method is at least equally effective as the state-of-the-art tools that adopt feature-based deep learning.</p> <p>Biography</p> <p>Mizuhito Ogawa, Dr. of Science, graduated from the master's course at the University of Tokyo, majoring in Mathematics. He worked at NTT laboratories on functional programs, dataflow machines, and dataflow analysis till 2001. Then, he was a JST PRESTO fellow until 2003 and stayed at the University of Tokyo as a visiting researcher. Since 2003, he has been in JAIST as a professor in the Schools of Information Science. In 2020, he also joined the Interpretable AI Center (2020-2023) in JAIST. His research interest covers from theory (math logic, discrete math, formal language) to practical tool implementation, especially focusing on formal methods of binary code, e.g., x86, ARM, and MIPS. BE-PUM for x86/Windows has been developed in collaboration with HCMUT and recently collaborated with LQDTU for 64-bit extension. CORANA for ARM and its extension HybridSE for Android/apk files are developed at JAIST.</p>
<p>12:30 - 13:30</p>	<p>Lunch Time</p>
<p>13:30 - 15:00</p>	<p>Title: An Introduction to GenAI Speaker: Prof Pham Van Cuong PTIT and Dr. Phong Nguyen VinAI</p> <p>Abstract: In this talk, we will present an introduction to Generative AI and its applications. The talk begins with generative modeling, i.e., how a model presents some distribution given a dataset, and then how it can generate data close to the training dataset. Next, we will show how some popular generative models, including Variational Autoencoder (VAE), Generative Adversarial Networks (GAN), and Diffusion models, generate empirical data from the representation learning within the models. The talk will end with some novel GenAI applications presented at CVPR 2024 and ECCV 2024, such as text-to-image generation.</p>

	<p>Biography Pham Van Cuong is an Associate Professor of Computer Science at the Posts and Telecommunications Institute of Technology (PTIT) and a Research Scientist at VinAI Research. He is also the Vice Dean of the Information Technology faculty at PTIT and the Director of PTITxAI Research Lab. Previously, he was a Marie Curie Research Fellow at Philips Research, a High-Tech campus in Eindhoven, the Netherlands. Before that, he earned a PhD degree in Computer Science from Newcastle University, UK. His research interests include Deep Generative models, Ubiquitous Computing, Computer Vision, Deep Learning, and Pervasive Healthcare. Cuong has regularly published papers in top-tier AI venues such as CVPR, NeurIPS, ECCV, AAAI, and UAI. More information about him can be found at the website https://sites.google.com/view/cuongpham/home</p> <p>Phong Nguyen was a PhD in Computer Science graduated from University of Oulu, Finland. He is currently a Research Scientist at VinAI in Ha Noi, Viet Nam. Before joining VinAI, I was a research intern at Meta and Nvidia working on Human View Synthesis and 4D Scene reconstruction. His main research topic are Neural Scene Representation, Generative Models and Human Avatar Reconstruction.</p>
<p>15:00-15:30</p>	<p>Break</p>
<p>15:30 - 17:00</p>	<p>Title: Generative Adversarial Network and Applications in Cyber Security Speaker: Prof Bui Thu Lam</p> <p>Abstract: Cyber security is a fascinating field of research with a wide range of problems involved with data analysis and prediction. That is why the applications of artificial intelligence in this field have been a hot topic. In this talk, I will cover the recent developments in using AI for cyber security applications, such as deep learning and adversarial machine learning.</p> <p>Biography: Dr. Lam Thu BUI received the Ph.D. degree in computer science from the University of New South Wales (UNSW), Australia, in 2007. He did postdoctoral training at UNSW from 2007 until 2009. He has been involved with academics including teaching and research since 1998. Currently, he is an Associate Professor in the Computer Science Academy of Cryptography Techniques (ACT), Hanoi, Vietnam. He is doing research in the field of AI, specializing with natural computation, including neural computation and and generative adversarial network (GAN) and its applications to cyber security evolutionary multiobjective optimization. He is the co-editor of the book Multiobjective Optimization in Computational Intelligence: Theory and Practice (IGI Global Information Science Reference Series); and the General Chair of the Ninth International Conference on Simulated Evolution and Learning –SEAL2012. He has been a member of the program committees of several conferences and workshops on Artificial Intelligence.</p>

School Day 2 - July 25, 2024

8:00 - 16:00

Registration

8:30 - 10:00

Title: Semantic Parsing with LLMs

Speaker: Dr. Nguyen Minh Phuong (online)

Meeting link:

<https://jaist.webex.com/jaist/j.php?MTID=ma3f021c246a583558be5b71fcfca1191>

Abstract:

In this presentation, I will introduce the tasks associated with Semantic Parsing, covering their definitions, historical development, applications, and the current state-of-the-art models. The talk will particularly focus on the challenges inherent to these tasks and the key components necessary for their resolution. I will explore both traditional methods and the utilization of instruction fine-tuning in Large Language Models to address these challenges.

Biography:

Nguyen Minh Phuong is currently a Postdoctoral Researcher at the School of Information Science, JAIST. He received his M.S. degree in Hanoi University of Science and Technology (HUST), Vietnam in 2019. He received his Ph.D. degree in Information Science from the School of Information Science, Japan Advanced Institute of Science and Technology (JAIST) in 2022. His current research interests consist of natural language processing tasks such as Semantic Parsing, Spoken Language Understanding, Neural Machine Translation, Question Answering, Legal Text Retrieval, Named Entity Recognition, Emotion Recognition in Conversation, etc. using neural network models.

10:00 - 10:30

Coffee Break

10:30 - 12:00

Title: "Retrieval Augmented Generation: A Brief Walk-Through"



Speaker: Dr. Tran Duc Vu

Abstract: In this talk, we will explore the emergence of Retrieval-Augmented Generation (RAG), a trending research area for Large Language Models (LLMs) to enhance an LLM's knowledge for accurate inference and combat its hallucination problems. The talk will walk through the evolution of RAG research to understand how it began with naive RAG, improved to advanced RAG, and, furthermore, to modular RAG. Together, we will also discuss several open questions that arose during the evolution process and for future development.

Bio: Vu Tran is an enthusiastic researcher in the field of Artificial Intelligence (AI). He is currently working as an Assistant Professor at the Institute of Statistical Mathematics in Tokyo. Vu received his Ph.D. in 2019 from the Japan Advanced Institute of Science and Technology. His research interests include AI and its applications in various domains, including the legal domain, the biomedical domain, social media, and climate.

12:00 - 13:30

Lunch time

<p>13:30 - 15:00</p>	<p>Title: Towards Trustworthy Reasoning with Large Language Models Speaker: Prof. Naoya Inoue (online)</p> <p>WebEx: https://jaist.webex.com/jaist/j.php?MTID=ma3f021c246a583558be5b71fcfa1191</p> <p>Abstract: Large Language Models (LLMs) have become core technologies in Artificial Intelligence. Despite their widespread use, a deep understanding of LLMs is still developing, and many challenges, such as hallucination, still remain. This talk begins with a brief overview of LLMs and summarizes existing efforts to comprehend their internal mechanisms and enhance the trustworthiness of LLMs. Finally, I will discuss our ongoing efforts towards more trustworthy reasoning with LLMs.</p> <p>Bio: Naoya Inoue received his MS degree in engineering from Nara Institute of Science and Technology in 2010 and his Ph.D. in Information Science from Tohoku University in 2013. He joined DENSO Corporation as a researcher in 2013. He was an assistant professor at Tohoku University (2015-2020) and a postdoctoral associate at Stony Brook University (2020-2022). Since 2022, he has been an associate professor at the Japan Advanced Institute of Science and Technology. He has also been a visiting researcher at RIKEN Center for Advanced Intelligence Project since 2018. His research interests include reasoning, explainability, and argumentation.</p>
<p>15:30-17:00</p>	<p>Title: Fine-Tuning Large Language Models for Specific Domains: A Case Study in Finance Speaker: Dr. Tran Van Khanh</p> <p>Abstract: With the rapid advancements in AI, large language models (LLMs) have become powerful tools in NLP tasks. However, their general-purpose nature can be a limitation when tackling domain-specific challenges. This talk focuses on the process and advantages of fine-tuning LLMs for domain-specific applications, particularly in finance. We will explore the essential steps of domain adaptation, including dataset selection, supervised fine-tuning techniques, and managing domain-specific subtasks. By using examples from financial forecasting, report generation, or other related finance tasks, we'll show how fine-tuning improves the model's accuracy and usefulness. You will also gain practical insights on how to apply these methods to make AI more tailored and effective for various specialized areas.</p> <p>Bio:</p> <ul style="list-style-type: none"> •2015-2018: <i>Ph.D. student at JAIST, Japan.</i> •<i>Topic: Machine Learning and Deep Learning for NLP, Dialogue, Chatbot</i>

• 2018-2019: *NLP Researcher at ALT Viet Nam Company Limited.* • 2019-2020: *Postdoc in Deep Learning at A2I2, Deakin University, Australia.*

• 2020-2023: *NLP Researcher at Virtual Assistant Center, VinBigdata*

• 2023-present: • *AI Research Scientist at Conversation Center, FPT Smart Cloud.* • *Deputy Director of IAST – ICTU.*

School Day 3 - July 26, 2024

8:30 - 10:00

Title: "Mastering Reinforcement Learning: Insights from Winning the AI Challenge 2023 with Tetris Battle"

Speaker: Dr. Tran TienCong (PTIT)

Abstract: In this talk, we will discuss the secret of winning the first prize in the AI Challenge 2023, where the competition focused on the classic game of Tetris driven by AI. By leveraging reinforcement learning techniques, the best team developed a high-performing AI agent capable of excelling in Tetris battles. This session will delve into the fundamental concepts of reinforcement learning, the specific algorithms and strategies employed, and the challenges faced along the way. Attendees will gain valuable insights into the practical application of reinforcement learning in gaming, and how these principles can be extended to solve complex problems in various domains. Whether you are a beginner or an expert in AI, this talk promises to provide actionable knowledge and inspiration for your own AI projects.

Bio: Cong Tran received his doctoral degree in computer science from Dankook University, Yongin, Republic of Korea, in 2021. He previously received his M.Sc. in computer science in 2014 and his B.Sc. in network and communication in 2009 from Vietnam National University, Hanoi, Vietnam. Since September 2021, he has been with the Faculty of Information Technology, Posts & Telecommunication Institute of Technology, Hanoi, Vietnam, as a lecturer. His research interests include social network analysis, data mining, and machine learning.

10:00-10:30

Coffee Break

10:30-12:00

Title: Panel discussion on AI and its application

Speakers: Prof Tu Minh Phuong, Prof Pham Van Cuong, Prof Nguyen Le Minh, Prof Mizuhito Ogawa, Dr. Tran Duc Vu, Dr. Nguyen Van Vinh

12:00-14:00

Photoshoot and Lunchtime