The 11th Hosei University IIST Colloquium

Master Thesis Report Session

第 11 回法政大学 IIST コロキウム

修了報告会

This colloquium is to introduce the IIST students' research achievements. Three graduating students will present their outstanding contributions to the research fields of software security assurance, memory design, and plan disease diagnosis. All of the IIST students will attend the colloquium and join the discussion.

Date and Time: 09:30- 10:30 July. 14th, 2018
日時：2018 年 7 月 14 日(土) 9:30-10:30

Venue: W103, Hosei University Koganei Campus
3-7-2 Kajiono cho, Koganei City, Tokyo 184-8584 JAPAN
会場：法政大学, 小金井キャンパス, 西館 1F W103

Host: Hosei University IIST: 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

TOP GLOBAL UNIVERSITY JAPAN

HOSEI University

PROGRAM

9:30-9:50 Huu Quan, CAP (2nd Year Master Student)

An End-to-End Practical Plant Disease Diagnosis System for Wide-Angle Cucumber Images

Abstract

With the breakthrough of deep learning techniques, many leaf-based automated plant diagnosis methodologies have been proposed. As far as our best knowledge, most of conventional methodologies only accept narrow range images, typically one or quite limited number of target(s) are in their input. This is because appearance of leaf is diverse and/or leaves are usually heavily overlap each other in practical. In this paper, we propose a basic and practical end-to-end plant disease diagnosis system for wide-angle images. Our system is principally composed of specially designed two types of convolutional neural network. The system achieves the leaf detection performance of 73.9% in F1-score, overall (detection and diagnosis) performance of 68.1% in recall and 65.8% in precision at around 3 seconds/image on a total of 500 wide-angle on-site images which have 6,860 healthy and 6,741 infected leaves (13,601 in total).

Huu Quan, CAP received the B.S degree from the University of Information Technology, Vietnam National University, Ho Chi Minh city, Viet Nam in 2016. He was a SAKURA Science exchanged student and came to Hosei University in March 2016. After that program, he decided to come back and continue to study at Hosei. He is now second year IIST master student of Graduate School of Science & Engineering in Hosei University, Koganei Campus. His current research is Deep Learning, Image Processing and applied it for agriculture. He is designing an end-to-end practical plant disease diagnosis system that helps farmers prevent disease and improve their productivity.

09:50-10:10 Peter Kimani Mungai (2nd Year Master Student)

Study on Chunking Mechanisms for a 3-Layered Associative Memory and Recall Model

Abstract

Memory models are important components that support AI computational models to learn and remember things. AI systems are expected to learn and improve with experience just as the human brain does. Without an efficient associative memory and recall system, the AI models cannot reliably perform cognitive tasks i.e. learn, store and remember. Usually, computers operate using an address-based memory for storage where each memory item resides in a unique location. This study proposes a 3-layered associative memory model based on chunking mechanisms of the brain to stores knowledge in form of association between entities. The human brain is a cognitive model that derives information from sensory data like vision, auditory, and touch, associates different patterns to create knowledge and uses chunking mechanisms to package the acquired knowledge into manageable entities. The use of chunking mechanisms by the brain aids it to overcome its short-term memory (STM) capacity limitation. Through Chunking, each item held in the STM is a chunk containing more associations (knowledge) in it. Using chunking mechanisms, AMR model can store knowledge in manner that enables faster response to stimuli. To represent knowledge and semantic relations effectively, the hyper structure (concept) defined in denotational mathematics is employed. For each memory item, its entities E, Properties A, internal relations $\boldsymbol{R^i}$, prior relations $\boldsymbol{R^{\ll}}$ and post relations $\boldsymbol{R^{\gg}}$ can be rigorously be described. As such, during stimulation, a memory item can reveal all its internal and external semantic relations which is required by cognitive models to perform cognitive functions such as reasoning or deductions. A network of concepts is maintained in a cognitive knowledge base that continually evolves as knowledge accumulates. The chunking mechanisms used in this study are in tune with the most vivid chunking mechanisms of the brain i.e. goal oriented chunking and automatic chunking.

Peter Mungai grew up in Nakuru, Kenya and aspired to be a scientist. After graduating with a bachelor's degree in Kimathi University, he moved to Japan to pursue a master's degree in computer and information sciences. Throughout his research work, he was actively involved in the activities of the AI lab and also published several research papers. Beside academics, he enjoys swimming, reading and travelling. His interests include cognitive computing, machine learning and entrepreneurship.

10:10-10:30 Busalire Onesmus Emeka (2nd Year Master Student)

Integrating Functional and Security Requirements Analysis using SOFL for Software Security Assurance

Abstract

Formal methods have been applied to define requirements for safety and/or security critical software systems in some industrial sectors, but the challenge is the lack of a systematic way to take security issues into account in specifying the functional behaviors. In this paper, we propose a formal approach to expressing and explicitly interweaving security and functional requirements. With this approach, the functional behaviors of the system are precisely specified using the Structured Object Oriented Formal Language (SOFL), the security rules are systematically explored, and the result is properly incorporated into the functional specification as constraints. The resultant specification then defines the system functionality that implies the conformance to the security rules. Such a specification can be used as a firm foundation for implementation and testing of the implementation. This approach aims at providing an interweaving approach of specifying both functional and security system requirements thereby eliminating the scenario where security requirements are elicited in an ad hoc manner. We discuss the principle of interweaving security rules with functional specifications and present a case study to demonstrate the feasibility of our approach.

Busalire Onesmus Emeka received his BSc Computer Science from Moi University, Kenya in 2012. Currently, he is a 2nd Year Masters student at Hosei University Graduate School of Computer and Information Science, Tokyo Japan. His current research is in Software Security with a focus on Requirement Specifications, especially for web applications. He is working on a security requirement engineering model that seeks to provide a weaving approach where a software`s functional and security requirement specifications can be defined together. The model shall enable software engineers give an early focus on software security at the Requirement Specifications phase of any Software Development Life Cycle . Emeka is also a tech-entrepreneur and spends some of his time researching and exploring favorable models of establishing ecosystems for technology Startups.