MINI SYMPOSIUM

2nd Mini-Symposium on Computations, Brains and Machine

July 14 (Tuesday), 2015
13:30 – 16:20
1F Seminar Room, BSI Central Building

13:30-13:35 Opening

13:35-14:25
Deep Learning for Visual Recognition: Convolutional Neural Networks and Beyond
Dr. Takayuki Okatani
Tohoku University

14:25-15:15
Large Graph: Efficient Algorithm and Graph Structure
Dr. Ken-ichi Kawarabayashi
National Institute of Informatics

15:15-15:30 Break

15:30-16:20
"Big Data Assimilation" revolutionizing numerical weather prediction
Dr. Takemasa Miyoshi
RIKEN Advanced Institute for Computational Science

16:30-18:00 Informal discussion (at Nakahara Lab/N201)

Host:
Hiro Nakahara Lab for Integrated Theoretical Neuroscience

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RIKEN Brain Science Institute

Deep Learning for Visual Recognition: Convolutional Neural Networks and Beyond

Dr. Takayuki Okatani
Tohoku University

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It has been a dream of computer vision to develop a computer algorithm that can recognize, i.e., say the name of, an object from its single image. Recently, the rapid growth of deep learning, more specifically, the "rediscovery" of convolutional neural networks (CNNs), has (arguably) made this dream come true. In fact, some results report that CNNs already perform comparable to human vision in terms of recognition accuracy. However, this task known as object category recognition is merely one of many visual recognition tasks, such as "object detection/localization" (i.e., locating where an object is in an image) and recognizing human activity/action from a video. Deep learning has not made a comparable success for these tasks. Although deep learning is already applied to them and has indeed updated the former state-of-the-art, there seems to be a long way to reach the performance of human vision. Furthermore, despite the above success of CNNs, there is no sufficient understanding as to why convolutional neural networks work so greatly (for object category recognition). In this talk, I summarize current research conducted in the field and try to speculate what is going to happen in the future.

Host:
Hiro Nakahara   Lab for Integrated Theoretical Neuroscience

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Large Graph:
Efficient Algorithm and Graph Structure

Dr. Ken-ichi Kawarabayashi
National Institute of Informatics

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Large-scale networks are now everywhere. Such large networks include the web structures of the Internet, and social networks like Facebook and Twitter. All these networks are expanding rapidly and are expected to grow to a scale of more than 10 billion users in the near future.

Starting from 2013, I am leading JST ERATO project for 5 years, and the main focus is "Large Graphs". The purpose of this project is to tackle on large graphs to provide efficient algorithms, based on theoretical research.
More precisely, we take advantage of graph theoretical tools, network structures based on modeling, and optimization tools to give efficient and scalable algorithmic for large graphs

In this talk, we introduce this project in details, and present some success.
More precisely, I will present some results for large graphs:
1. Theoretically very fast algorithms, and
2. Efficient algorithm based on theoretical tools

Host:
Hiro Nakahara   Lab for Integrated Theoretical Neuroscience

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Brain Science Institute RIKEN

“Big Data Assimilation” revolutionizing numerical weather prediction

Dr. Takemasa Miyoshi

RIKEN Advanced Institute for Computational Science

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The weather system is chaotic, and data assimilation plays a central role in predicting the chaotic weather by synchronizing a numerical simulation. Data assimilation integrates simulations (i.e., virtual world on computers) and real-world data based on statistical mathematics and brings synergy. New sensors produce orders of magnitude more data than the current sensors, and faster computers enable orders of magnitude more precise simulations, or “Big Simulations”. Data assimilation deals with the “Big Data” from both new sensors and Big Simulations. We started a “Big Data Assimilation” project, aiming to develop a revolutionary weather forecasting system to refresh 30-minute forecasts at a 100-m resolution every 30 seconds, 120 times more rapid than the current hourly-updated systems. We also investigated ensemble data assimilation using 10240 ensemble members, largest ever for the global atmosphere. Based on the experience using the Japanese 10-petaflops “K computer”, we will discuss the future of data assimilation in the forthcoming Big Data and Big Simulation era.

Host:

Hiro Nakahara   Lab for Integrated Theoretical Neuroscience