



WCCI2008 Workshop

Machine Learning in Cognitive Networks: Theory, Application, and Future

During WCCI2008, HongKong, June 6 2008

Abstract

Cognitive networks has attracted increasing attention as an advanced form of future networks that is aware of changes in user needs and its environment, adapts its behavior to those changes, learns from its adaptations, and exploits knowledge to improve its future behavior. The notion of cognition in cognitive networks implies a number of intelligent tasks including perception, acting and planning, learning, reasoning, and decision making, all of which require a robust knowledge representation that facilitates the sharing and reuse of knowledge. Hence, machine learning and reasoning play a key role in fuelling and driving the advance of cognitive networks.

This workshop aims to explore the state-of-the-art application of machine learning in cognitive networks and discuss the problems and practical issues of learning in cognitive network applications. This workshop will also serve as a forum to bring together academic and industrial researchers working in both areas for discussing recent advances in theory and application of learning techniques for cognitive networking.

Themes and Topics

A cognitive network is one that is aware of changes in user needs and its environment, adapts its behavior to those changes, learns from its adaptations, and exploits knowledge to improve its future behavior. The notion of cognition in cognitive networks implies a number of intelligent tasks including perception, acting and planning, learning, reasoning, and decision making, all of which require a robust knowledge representation that facilitates the sharing and reuse of knowledge. Hence, machine learning and reasoning play a key role in fuelling and driving the advance of cognitive networks.

Recently a set of enhancements to the original knowledge plane has been proposed for cognitive networks to provide high-level dynamic cognitive functionality to augment the existing low-level rule policies that dictate how the network should behave in certain scenarios. Learning engines have also been proposed to support decision making for context-aware services and applications. However, challenges remain in turning these learning models into viable commercial products. There are also a mix of open issues regarding the implementation of cognition, including distributed learning, decision fusion and robust decision making, dynamic adaptation of parameters, iterative numerical algorithms, and complex adaptive behavior, among others.

In this workshop, we will discuss the following non-exhaustive list of topics:

- theory and application of learning, reasoning, and adaptive methods in cognitive networking;
- hybrid learning models and techniques that combine neural computational algorithms with abstraction and reasoning of a priori knowledge
- advances in defining and using a common knowledge representation that can support different types of dissimilar knowledge for data and decision fusion
- methods and applications of data fusion, decision fusion, diagnostic analysis for cognitive network management;
- application of different forms of computational intelligence to automate decision making in cognitive networks
- application of information and data models to support machine learning in cognitive networking
- application of ontologies and semantic reasoning algorithms to support machine reasoning in cognitive networking
- embedded/distributed real-time learning and knowledge processing;
- implementations of machine learning techniques in cognitive network solutions and experience/lessons learned;
- state-of-the-art survey of machine learning in cognitive networking.

Workshop Schedule/Important Dates

Submission deadline: March 28, 2008 (tentative)

Review period: March 28 – April 8, 2008

Notification Date: April 8, 2008

Registration Deadline: April 15, 2008

Final version submission: May 3, 2008

Workshop Proceedings

We plan to propose a Special Issue based on the submissions of this workshop in a major Journal or book on Computational Intelligence (TBD), where extended versions of accepted workshop papers will be published.

Workshop Organizers

Prof. Er Meng Joo,
Associate Professor, School of Electrical & Electronic Engineering,
Nanyang Technological University (NTU), Singapore.
Email: emjer@ntu.edu.sg

Prof. John Strassner,
Associate Professor, Waterford Institute of Technology, Waterford, Ireland,
Motorola Fellow and Vice President, Autonomic Research
Motorola Labs, USA.
Email: john.strassner@motorola.com

Dr. Yan Liu,
Autonomics Research, Motorola Labs, USA.
Email: yanliu@motorola.com