ARTIFICIAL INTELLIGENCE

INTRODUCTION

The aim of this course is to introduce to the participants to Machine Intelligence (or Artificial Intelligence) and selected applications, MI exists at the intersection of machine learning and artificial intelligence, it is the enabler for a machine to interact with its environment in an intelligent way.

Machine intelligence technologies have experienced a global resurgence due to the Internet of Thing (IoT) resulted in the growing volumes and varieties of data, the utility of this data in creating smart systems and increased awareness of the value of data have changed our life dramatically. Machine intelligence allows organizations to operate more efficiently and effectively, using data to predict the future and manage the present. Computer systems with machine intelligence can perform a variety of tasks: Optimize and automate processes; extract and classify data; analyze and predict trends/patterns; Enhance interaction with humans/the environment.

This course starts with the principles of various fundamental, basic concepts and algorithms in Bayesian Classifiers, machine learning, and neural networks. The use of powerful computers in computational learning is to learn knowledge (or regularities) from the raw data.

This course covers various areas ranging from supervised learning to unsupervised learning as well as the various applications of machine learning.

This course includes reading assignments designed to help you understand more to expand their knowledge beyond what is taught. Beside the knowledge, students will gain experience studying their strategies and learning to emulate them.

COURSE OBJECTIVES

- To discuss basic concepts and general knowledge of machine learning, data analytics, and data mining processing. Be able to pre-process the data so that it can be analyzed further using sophisticated data analytics and mining algorithms.

- To provide students with essential concepts and skills in machine learning that will enable them to understand how to apply various machine-learning techniques to solve real-world problems.

- To equip students with the basic concepts and algorithms in Bayesian Classifiers, machine learning, and neural networks. To exploit computational learning is to make better use of powerful computers to learn knowledge (or regularities) from the raw.

COURSE OUTLINE

Class 1
Introduction
What is AI
Tools used for AI
Prerequisite for AI
Understanding Data, Data Cube. Big Data
Preliminary exploration, Visualization, and its characteristics

Class 2
Decision Tree
Rule-Based Classifier

Class 3
Bayesian Classifiers (Naïve Bayes Classifier)
KNN and K-means Clustering
Ensemble Classifiers

Class 4
Support Vector Machines (SVM)

Class 5
Artificial Neural Networks (ANN) and Backpropagation
Deep Learning and Various Architectures.

Class 6
Group presentation by the students

Duration
2.5 hours x 6 sessions

TEACHING METHODOLOGY

Series of lectures.

Numerical examples to improve understanding.

Questions and Answers.

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Dr. Kwoh Chee Keong is currently in the School of Computer Science and Engineering since 1993. He is also the Executive Deputy Director of Centre for Professional and Continuing Education, PaCE@NTU. His was the Assistant Chair of Graduate Studies; School Appraisal Committee for Services. He was the Programme Director, MSc (Bioinformatics), the Deputy Director, Biomedical Engrg Research Centre, NTU, and Deputy Director, Biomedical & Pharmaceutical Engineering Cluster (BPE) Cluster and had a joint appointment in the School of Chemical and Biomedical Engineering.

He has done significant research work his research areas applying various Machine Learning and Data Analytics methodologies and published many quality international conferences and journal papers. His is in the Editorial Board Members and Associate Editor for of The International Journal of Data Mining and Bioinformatics; IEEE Access; TheScientificWorldJOURNAL; Network Modeling and Analysis in Health Informatics and Bioinformatics (NetMAHIB); Theoretical Biology Insights; and Bioinformation. He has been Guest Editor for many journals such as JMMB; International Journal on Biomedical and Pharmaceutical Engineering and others. He has been often invited as organizing member or referee and reviewer for a number of premier conferences and journals, including GIW, IEEE BIBM, RECOMB, PRIB, BIBM, ICDM, and iCBBE just to name a few. He has provided many services to professional bodies, and the Singapore and was conferred the Public Service Medal by the President of Singapore in 2008.

RESEARCH EXPERTISE
Dr. Kwoh main interests lie in our desire to making sense of big heterogeneous data by applying various AI, Machine Learning and Data Analytics methodologies for real application in engineering, life science, medical and manufacturing. These include: Data Analytics and Mining, Soft Computing, Artificial Intelligence, Machine Learning, and Statistical Inference, Learning with Unlabeled Data, Meta and Ensemble learning.