Machine Learning Algorithms and Applications

This course introduces a dozen of machine learning algorithms and typical applications in business intelligence, natural language processing, computer vision, and sensor-based data analyses, including four topics that consist of (1) supervised learning algorithms induced by structural risk minimization for classification and regression problems (decision trees, logistic regression, support vector machines, regularized linear regression, kernel machines, etc.), and their applications in sensor-based indoor localization, business intelligence; (2) supervised learning algorithms based on deep learning (CNN, RNN, etc.), and their applications to natural language processing and computer vision; (3) unsupervised learning algorithms for clustering and representation learning (K-means, spectral clustering, autoencoder, etc.); (4) introductions of other learning algorithms and applications, such as transfer learning, recommender systems, sensor-based activity recognition, etc.

Grade Descriptor:

A

EXCELLENT - exceptionally good performance and far exceeding expectation in all or most of the course learning outcomes; demonstration of superior understanding of the subject matter, the ability to analyze problems and apply extensive knowledge, and skillful use of concepts and materials to derive proper solutions.

B

GOOD - good performance in all course learning outcomes and exceeding expectation in some of them; demonstration of good understanding of the subject matter and the ability to use proper concepts and materials to solve most of the problems encountered.

C

FAIR - adequate performance and meeting expectation in all course learning outcomes; demonstration of adequate understanding of the subject matter and the ability to solve simple problems.
D

MARGINAL - performance barely meets the expectation in the essential course learning outcomes; demonstration of partial understanding of the subject matter and the ability to solve simple problems.

有關等級說明的資料，請參閱英文版本。

F

FAILURE - performance does not meet the expectation in the essential course learning outcomes; demonstration of serious deficiencies and the need to retake the course.

有關等級說明的資料，請參閱英文版本。

Equivalent Offering:
Units: 3 (Min) / 3 (Max) / 3 (Acad Progress)
Grading Basis: Graded
Repeat for Credit: N
Multiple Enroll: N
Course Attributes: MSc Computer Science, MPhil-PhD Computer Sci & Erg

Topics:

COURSE OUTCOMES

Learning Outcomes:
At the end of the course of studies, students will be able to:
1. Apply appropriate machine learning algorithms to solve specific real-world applications.
2. Revise or design new machine learning algorithms based on specific requirements.

Course Syllabus:
Week 1: Introduction of machine learning and supervised learning algorithms induced by structural risk minimization I
Week 2: Introduction of machine learning and supervised learning algorithms induced by structural risk minimization II
Week 3: Introduction of machine learning and supervised learning algorithms induced by structural risk minimization III
Week 4: Introduction of machine learning and supervised learning algorithms induced by structural risk minimization IV
Week 5: Supervised learning algorithms based on deep learning I
Week 6: Supervised learning algorithms based on deep learning II
Week 7: Supervised learning algorithms based on deep learning III
Week 8: Supervised learning algorithms based on deep learning IV
Week 9: Unsupervised learning algorithms I
Week 10: Unsupervised learning algorithms II
Week 11: Unsupervised learning algorithms III
Week 12: Other topics I
Week 13: Other topics II

Assessment Type:
- Homework or assignment: 40%
- Presentation: 10%
- Project: 50%

Feedback for Evaluation:
1. Quiz and examinations
2. Course evaluation and questionnaire
3. Question-and-answer sessions during class
4. Student consultation during office hours or online

Required Readings:
To be provided by course teacher.

Recommended Readings:
2. Introduction to Data Mining, by Pang-Ning Tan, Michael Steinbach, and Vipin Kumar, Addison Wesley, 2005.

OFFERINGS
1. CSCI5150
   Acad Organization=CSEG; Acad Career=RPG

COMPONENTS
- LEC: Size=30; Final Exam=Y; Contact=3
- TUT: Size=30; Final Exam=N; Contact=1

ENROLMENT REQUIREMENTS
1. CSCI5150
   Enrollment Requirement Group:
For students in MSc Computer Science; or
For students in MPhil-PhD Computer Science & Engineering; or
For students in UG Computer Science; or
For students in UG Computer Engineering;
Exclusion: FTEC5580

New Enrollment Requirement(s):
Exclusion = FTEC5580