課　　綱　Course Outline

理工學院學士班

中文課程名稱 Course Name in Chinese	機器學習				
英文課程名稱 Course Name in English	Machine Learning				
科目代碼 Course Code		班 別 Degree			
修別 Type	選	學分數 Credit(s)	3.0	時 數 Hour(s)	3.0
先修課程 Prerequisite					

課程目標
Course Objectives

Machine learning allows computational systems to adaptively improve their performance with experience accumulated from the data observed. This course introduces the basics of learning theories, the design and analysis of learning algorithms, and some applications of machine learning.

課程大綱
Course Outline

1. course introduction;
   topic 1: when can machines learn?
   the learning problem
2. learning to answer yes/no;
   types of learning
3. feasibility of learning;
   topic 2: why can machines learn?
   training versus testing
4. (optional)theory of generalization;
   the VC dimension;
   noise and error
5. topic 3: how can machines learn?
   linear regression;
   logistic regression
6. linear models for classification;
   nonlinear transformation
7. topic 4: how can machines learn better?
   hazard of overfitting;
   regularization
8. validation;
   three learning principles
9. topic 5: how can machines learn by embedding numerous features?
   linear support vector machine;
   dual support vector machine
10. kernel support vector machine;
    soft-margin support vector machine

11. support vector machine for soft binary classification;
    topic 6: how can machines learn by combining predictive features?
    blending and bagging
12. adaptive boosting;
    decision tree;
    random forest;
    gradient boosted decision tree
13. topic 7: how can machines learn by distilling hidden features?
    neural network;
    deep learning
14. modern deep learning

資源需求評估(師資專長之聘任、儀器設備的配合···等) Resources Required(e.g. qualifications and expertise, instrument and equipment,etc.)

課程要求和教學方式之建議 Course Requirements and Suggested Teaching Methods
Language: English teaching Grading: 1. 70% homework 2. 30% project (tentative)

其他 Miscellaneous