主導課程八:機器學習 Machine Learning

課程基本資料

開設學校:臺灣大學

開授教師:林軒田

班級人數:500人 (保留300人給台大, 聯盟學校平均每校約10人)

開課級別:研究所(原則准許大三以上同學修習)

授課語言:中文

學分數:3

授權方式:封閉式

上課時間:星期三 09:10-12:10

是否接受非同步授課:是

實體期末評量時間:The final exam will be held on December 9, 2026.

課程概述

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.

課程目標

The course is designed to prepare junior graduate students with a solid background of

machine learning and allow them to use machine learning techniques appropriately in their future research or industry projects.

課程特色

參考書目

Learning from Data, by Yaser Abu-Mostafa, Malik Magdon-Ismail and Hsuan-Tien Lin

課程內容大綱

Week	Date	syllabus	todo/done
1	9-Sep	course introduction; **topic 1: when can machines learn?** the learning problem	homework 0 announced
2	16-Sep	learning to answer yes/no; types of learning	homework 1 announced
3	23-Sep	feasibility of learning; **topic 2: why can machines learn?** training versus testing	
4	30-Sep	the VC dimension; noise and error	homework 2 announced
5	7-Oct	**topic 3: how can machines learn?** linear regression; logistic regression	

6	14-Oct	linear models for classification; nonlinear transformation	homework 0 due; homework 1 due; homework 2 due; homework 3 announced
7	21-Oct	**topic 4: how can machines learn better?** hazard of overfitting; regularization	
8	28-Oct	validation; three learning principles	homework 3 due; homework 4 announced; final project announced
9	4-Nov	**topic 5: how can machines learn by embedding numerous features?** linear support vector machine; dual support vector machine	
10	11-Nov	kernel support vector machine; soft-margin support vector machine	homework 4 due; homework 5 announced
11	18-Nov	**topic 6: how can machines learn by combining predictive features?** blending and bagging; adaptive boosting	
12	25-Nov	decision tree; random forest; gradient boosted decision tree	homework 5 due; homework 6 announced

13	2-Dec	**no class as instructor needs to attend ACML 2026 and NeurIPS 2026**; recording: machine learning for modern artificial intelligence	
14	9-Dec	Final exam	
15	16-Dec	**topic 7: how can machines learn by distilling hidden features?** neural network; (preliminary) deep learning	homework 6 due
16	23-Dec	modern deep learning/finale	

成績評量方式

- 50% 作業
- 20% 考試
- 30% 專題(tentative)

課程要求

Computer Programming, Calculus, Probability, Linear Algebra