EE3700 Introduction to Machine Learning

機器學習導論

Hsi-Pin Ma 馬席彬

http://lms.nthu.edu.tw/course/40724

Department of Electrical Engineering

National Tsing Hua University

Syllabus (1/3)

- Credit: 3
- Class time-slot
  - Class: M3M4W2
- Instructor: Hsi-Pin Ma (馬席彬)
  - Delta Bldg. RM 965, 5162206
  - E-Mail: hp@ee.nthu.edu.tw
  - Office hour: W34
- Prerequisite
  - Programming, Linear Algebra, Probability

Syllabus (2/3)

- Textbook
  - S. Raschka and V. Mirjalili, *Python Machine Learning: Machine Learning and Deep Learning with Python, Scikit-Learn, and TensorFlow*, 2nd Edition. Packt Publishing, 2017.
- References
  - Machine Learning
    - A. Geron, Hands-On Machine Learning with Scikit-Learn & TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. O'Reilly, 2017.
    - F. Chollet, Deep Learning with Python. Manning, 2017.
    - S. Shalev-Shwartz and S. Ben-David, *Understanding Machine Learning: From Theory to Algorithms*. Cambridge University Press, 2014.
    - M. Mohri, A. Rostamizadeh, and A. Talwalkar, *Foundations of Machine Learning*. The MIT Press, 2012.
    - S. Marsland, Machine Learning - An Algorithmic Perspective. Chapman & Hall, 2009.
    - T. M. Mitchell, *Machine_Learning*. McGraw-Hill, 1997.
  - Python
    - J. V. Guttag, Introduction to Computation and Programming Using Python: With Application to Understanding Data, 2nd edition. The MIT Press, 2016.
    - R. Johansson, *Numerical Python*: *A Practical Techniques Approach for Industry*. Apress, 2015. (There is an electronic version of this book in NTHU Library.)

Syllabus (3/3)

- Grading
  - Homework: 75%
  - Final Project: 25%

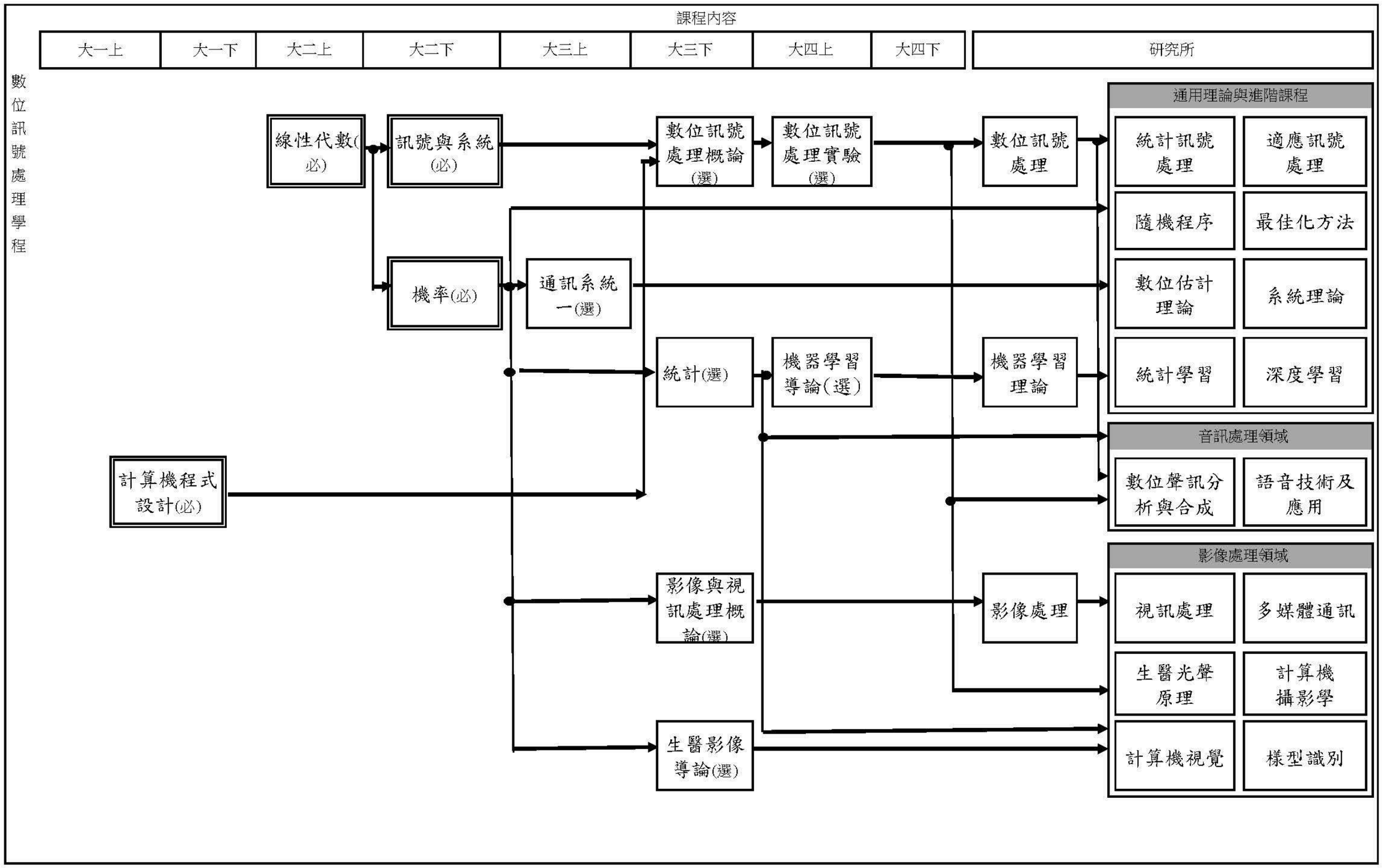
Course Outline

- Learning problem and learning system
- Representation of hypothesis: decision trees, linear discriminants, artificial neural networks
- Supervised learning: classification, regression, and support vector machine
- Unsupervised learning: K-nearest neighbor, clustering, dimension reduction
- Deep learning: multilayer ANNs, TensorFlow, convolutional neural networks, recurrent neural networks

Textbook Outline

- Learning from data
- Simple machine learning algorithm for classification
- Machine learning classifiers using Scikit-Learn
- Data preprocessing
- Dimension reduction
- Model evaluation and hyperparameter tuning
- Ensemble learning
- Sentiment analysis
- Regression analysis
- Clustering analysis
- Multilayer artificial neural networks
- Neural network training with TensorFlow
- The mechanics of TensorFlow
- Deep convolutional neural networks
- Recurrent neural networks

數位訊號處理學程


課程內容
大一上
大一下
大二上
大二下
大三上
大三下
大四上
大四下
研究所
數位訊號處理學程
線性代數(必)
訊號與系統(必)
機率(必)
計算機程式設計(必)
數位訊號處理概論(選)
數位訊號處理實驗(選)
通訊系統一(選)
統計(選)
機器學習導論(選)
影像與視訊處理概論(選)
生醫影像導論(選)
數位訊號處理
機器學習理論
影像處理
通用理論與進階課程
統計訊號處理
適應訊號處理
隨機程序
最佳化方法
數位估計理論
系統理論
統計學習
深度學習
音訊處理領域
數位聲訊分析與合成
語音技術及應用
影像處理領域
視訊處理
多媒體通訊
生醫光聲原理
計算機攝影學
計算機視覺
樣型識別