

數值分析專題 (I)

課程資訊

課 碼：2106511

學 分 數：3

上課時間：週二、週四下午 14:45—16:00

授課老師資訊

任課教師：賴振耀

研究室：數學館 416 室、研究室電話分機：66103

諮詢時間：

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教學目標

引導學生瞭解近年來深度學習與電腦視覺等相關研究課題之連結與發展。

授課大綱

- **Applied Math Basics:** Eigen-decomposition, Linear Least Squares, SVD, Pseudoinverse, PCA, Gradient-Based Optimization, Constrained Optimization
- **Machine Learning Basics:** Learning Algorithms; Capacity, Overfitting and Under-fitting; Hyperparameters and Validation Sets; Supervised Learning Algorithms; Unsupervised Learning Algorithms; Stochastic Gradient Descent
- **Deep Networks Basics:** Gradient-Based Learning; Hidden Units; Architecture Design; Back-Propagation and Other Differentiation Algorithms; Regularization for Deep Learning; Optimization for Training Deep Models
- **Convolutional Networks, Recurrent and Recursive Nets, Applications**

參考書籍

- Ian Goodfellow, Yoshua Bengio and Aaron Courville. *Deep Learning*, MIT Press, 2016 (html version: <http://www.deeplearningbook.org> or <https://github.com/janishar/mit-deep-learning-book-pdf/blob/master/complete-book-pdf/deeplearningbook.pdf>)
- Aurélien Géron. *Hands-on machine learning with Scikit-Learn and TensorFlow : concepts, tools, and techniques to build intelligent systems*, Sebastopol, CA, O'Reilly Media, 2017. (精通機器學習：使用 Scikit-Learn, Keras 與 TensorFlow / Aurélien Géron 原著；賴屹民譯。基峰資訊, 2020.)
- M. LinkSwamynathan. *Mastering machine learning with Python in six steps: a practical implementation guide to predictive data analytics using Python*, 2nd ed., Apress, 2019. (access by CCU ebook link: <https://doi.org/10.1007/978-1-4842-4947-5>)
- Danish Haroon. *Python machine learning case studies: five case studies for the data scientist* (access by CCU ebook link: <http://dx.doi.org/10.1007/978-1-4842-2823-4>)
- Gareth James, Daniela Witten, Trevor Hastie and Robert Tibshirani. *An introduction to*

statistical learning with applications in R, Springer New York (access by CCU ebook link: <http://dx.doi.org/10.1007/978-1-4614-7138-7>)

- Jerome Friedman, Robert Tibshirani, Trevor Hastie. *The elements of statistical learning: data mining, inference, and prediction*, Springer-Verlag New York, (access by CCU ebook link: <http://dx.doi.org/10.1007/b94608>)

評量方式

- 作業、上課表現（依輪流上台報告、課堂討論與提問表現評分）：60%。
- 期末報告 40%

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