國立中山大學 110學年度第2學期 課程教學大綱

National Sun Yat-sen University 110Academic year Course syllabus

中文名稱 Course name(Chinese)	數據科學實務			課號 Course Code	MATH604
英文名稱 Course name(English)	DATA SCIENCE CAPSTONE PROJECT				
課程類別 Type of the course	講授類	必選修 Required/Selected	選修	系所 Dept./faculty	應用數學系碩士班
授課教師 Instructor	鍾思齊			學分 Credit	3

因應嚴重特殊傳染性肺炎(武漢肺炎)，倘若後續需實施遠距授課，授課方式調整如下：Since COVID-19, if distance learning is necessary, the teaching methods would adjust as follows:

尚未建立傳染性肺炎(武漢肺炎)授課方式調整

因應嚴重特殊傳染性肺炎(武漢肺炎)，倘若後續需實施遠距授課，評分方式調整如下：Since COVID-19, if distance learning is necessary, the evaluation would adjust as follows:

1.Homework：20%
2.Midterm Project：40%
3.Final Project：40%

課程大綱 Course syllabus

1. Data science pipeline
2. Neural networks and hyperparameter tuning
3. Data wrangling and SQL
4. Data cleaning and feature engineering
5. Gradient boosting and ensemble learning
6. Model serving

課程目標 Objectives

This Data Science Capstone aims to focus on the practical aspect of data science in the real world. In the capstone, students will learn to engage on a real-world project requiring them to apply skills from the entire data science pipeline: preparing, organizing, and transforming data, constructing a model, and evaluating results. Moreover, advanced modeling methods, including neural networks and gradient boosting, will also be covered.

授課方式 Teaching methods

Lecture.
(1) All class assignments and project will be in Python (we provide some tutorials for those who aren't as familiar with Python)
(2) You should know the basics of statistics and modeling
(3) Be sure to wear the mask in the class and follow the guidance of the school
(4) We will have a Facebook group for discussion. Please checkout in https://cu.nsysu.edu.tw/mooc/index.php

評分方式〔評分標準及比例〕Evaluation (Criteria and ratio)等第制單科成績對照表 letter grading reference

1.Homework：20%
2.Midterm Project：40%
3.Final Project：40%

參考書/教科書/閱讀文獻 Reference book/ textbook/ documents
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序號 No.	作者 Auther	書名 Title	出版社 Publisher	出版年 Year of publish	出版地 Publisher place	ISBN# ISBN#
1	Aurélien Géron	Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems. Second Edition	O'Reilly	2019		978-1492032649
2	Gareth James, Daniela Witten, Trevor	An Introduction to Statistical Learning with Applications in R. Second Edition The Elements of Statistical Learning, Data Mining,	Springer	2021		978-1071614174

	Hastie and Robert Tibshirani	Inference, and Prediction. Second Edition.

每週課程內容及預計進度 Weekly scheduled progress

週次 Week	日期 Date	授課內容及主題 Content and topic
1	2022/02/13~2022/02/19	The data science landscape
2	2022/02/20~2022/02/26	Neural network and its training
3	2022/02/27~2022/03/05	Convolutional neural networks
4	2022/03/06~2022/03/12	Recurrent neural networks
5	2022/03/13~2022/03/19	Finetuning and transfer learning
6	2022/03/20~2022/03/26	Hyperparameter search and meta-learning
7	2022/03/27~2022/04/02	Representation learning
8	2022/04/03~2022/04/09	Spring break
9	2022/04/10~2022/04/16	Midterm project
10	2022/04/17~2022/04/23	Data cleaning and feature engineering
11	2022/04/24~2022/04/30	Data wrangling and relational database
12	2022/05/01~2022/05/07	Dimensional reduction and clustering
13	2022/05/08~2022/05/14	Good practice for small dataset
14	2022/05/15~2022/05/21	Gradient boosting and ensemble learning
15	2022/05/22~2022/05/28	Explainable AI
16	2022/05/29~2022/06/04	Model serving
17	2022/06/05~2022/06/11	Final project
18	2022/06/12~2022/06/18	Final project

課業討論時間 Office hours

時段1 Time period 1:
時間 Time：星期一16:10~18:10
地點 Office/Laboratory：SC2002-4
時段2 Time period 2：
時間 Time：星期三16:10~18:10
地點 Office/Laboratory：SC2002-4

系所學生專業能力/全校學生基本素養與核心能力 basic disciplines and core capabilitics of the dcpartment and the university

系所學生專業能力/全校學生基本素養與核心能力 basic disciplines and core capabilities of the department and the university	課堂活動與評量方式 Class activities and evaluation										
	本課程欲培養之能力與素養 This course enables students to achieve.	紙筆考試或測驗 Test.	課堂討論（含個案討論） Group discussion (case analysis).	個人書面報告、作業、作品、實驗 Indivisual paper report/ assignment/ work or experiment.	群組書面報告、作業、作品、實驗 Group paper report/ assignment/ work or experiment.	個人口頭報告 Indivisual oral presentation.	群組口頭報告 Group oral presentation.	課程規劃之校外參訪及實習 Off-campus visit and intership.	證照/檢定 License.	參與課程規劃之校內外活動及競賽 Participate in off-campus/ on-campus activities and competitions.	課外閱讀 Outside reading.
※系所學生專業能力 Basic disciplines and core capabilities of the department											
1.各組專業領域(統計、科學計算或數學)之完整知識。 1. Professional knowledge in the major fields (statistics, scientific computing, mathematics).	V		V		V		V				
2.有從事研究工作之經驗。 2. Experience in doing research work.	V		V		V		V				

3.撰寫專題報告之能力。 3. Ability in writing special topics reports.	V		V		V		V				
4.公開演講之能力。 4. The ability of public speaking.	V		V		V		V				
※全校學生基本素養與核心能力 Basic disciplines and core capabilities of the university											
1.表達與溝通能力。 1. Articulation and communication skills	V		V		V		V				
2.探究與批判思考能力。 2. Inquisitive and critical thinking abilities	V		V		V		V				
3.終身學習能力。 3. Lifelong learning	V		V		V		V				
4.倫理與社會責任。 4. Ethnics and social responsibility											
5.美感品味。 5. Aesthetic appreciation											
6.創造力。 6. Creativity											
7.全球視野。 7. Global perspective											
8.合作與領導能力。 8. Team work and leadership											
9.山海胸襟與自然情懷。 9. Broad-mindedness and the embrace of nature											

本課程與SDGs相關項目：The course relates to SDGs items:

尚未建立SDGS資料

本課程校外實習資訊: This course is relevant to internship:

本課程無註記包含校外實習

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