Syllabus of Machine Learning

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Goal

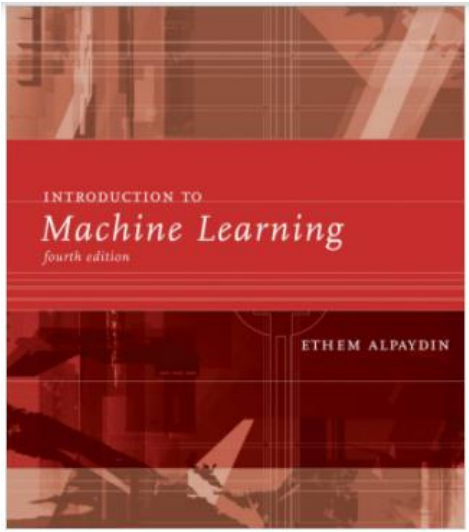
- Learn the basic knowledge and implementation techniques of machine learning.
  - Supervised Learning
  - Unsupervised Learning
  - Reinforcement Learning
- Create a wonderful final project so you can tell your son(s)/daughter(s), this is your project.
  - Make contributions on what you care

Prerequisite

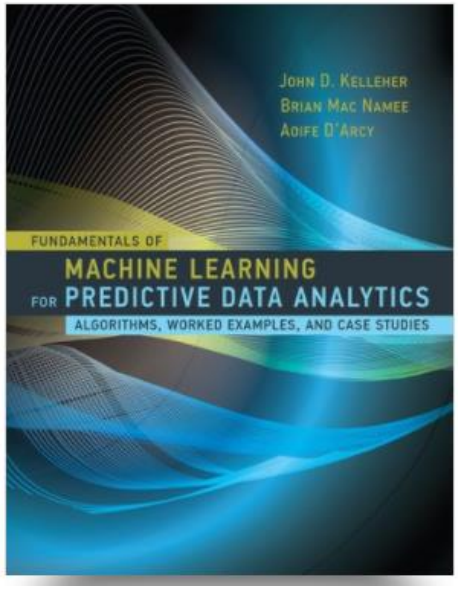
- Basic python programming ability
- Data structure
- Algorithms

Books

- Introduction to Machine Learning, Fourth Edition
  - Ethem Alpaydin



- Fundamentals of Machine Learning for Predictive Data Analytics
  - John D. Kelleher, Brian Mac Namee, Aoife D'Arcy



Slides

- Portal system

Syllabus

週次	日期	課程主題	內容	作業
1	2月16日	說明課程		
2	2月23日	機器學習與資料前處理介紹	機器學習課程與競賽內容簡介 資料前處理技術(資料分析常用的函式庫介紹、Numpy的基礎、Pandas的基礎、資料前處理)	資料前處理作業
3	3月2日	機器學習模型	迴歸、分類模型、分群模型介紹	分類模型作業
4	3月9日	深度學習模型-DNN	DNN模型概念介紹	• 個人Proposal提案 • 個人提案介紹投影片 • 個人錄影
5	3月16日	DNN模型實作	DNN模型實作	
6	3月23日	深度學習模型-CNN	CNN模型概念介紹	DNN模型作業完成
7	3月30日	CNN與物件辨識模型實作	CNN與YOLO模型實作教學	• CNN模型作業完成 • YOLO模型作業完成
8	4月6日	民族掃墓連假		
9	4月13日	期中考		
10	4月20日	口頭報告提案投影片 競賽能力介紹	提案申請書撰寫介紹、投影片製作邏輯介紹、口頭報告技巧介紹	
11	4月27日	聯邦式學習	聯邦式模型介紹	• Fed SVM實作
12	5月4日	Edge AI	Edge AI教學與實作	
13	5月11日	Edge AI	Edge AI教學與實作	• Edge AI成果報告
14	5月18日	深度學習模型-RNN	RNN模型概念介紹	
15	5月25日	強化式學習	Reinforcement Learning概念介紹	• 閱讀Paper以及撰寫報告
16	6月1日	元學習	Meta Learning概念介紹	
17	6月8日	期末專題報告 (1)	由學生報告期末專題，可以以競賽的作品內容為主題進行報告	團體Proposal提案 團體提案投影片
18	6月15日	期末專題報告 (2)		

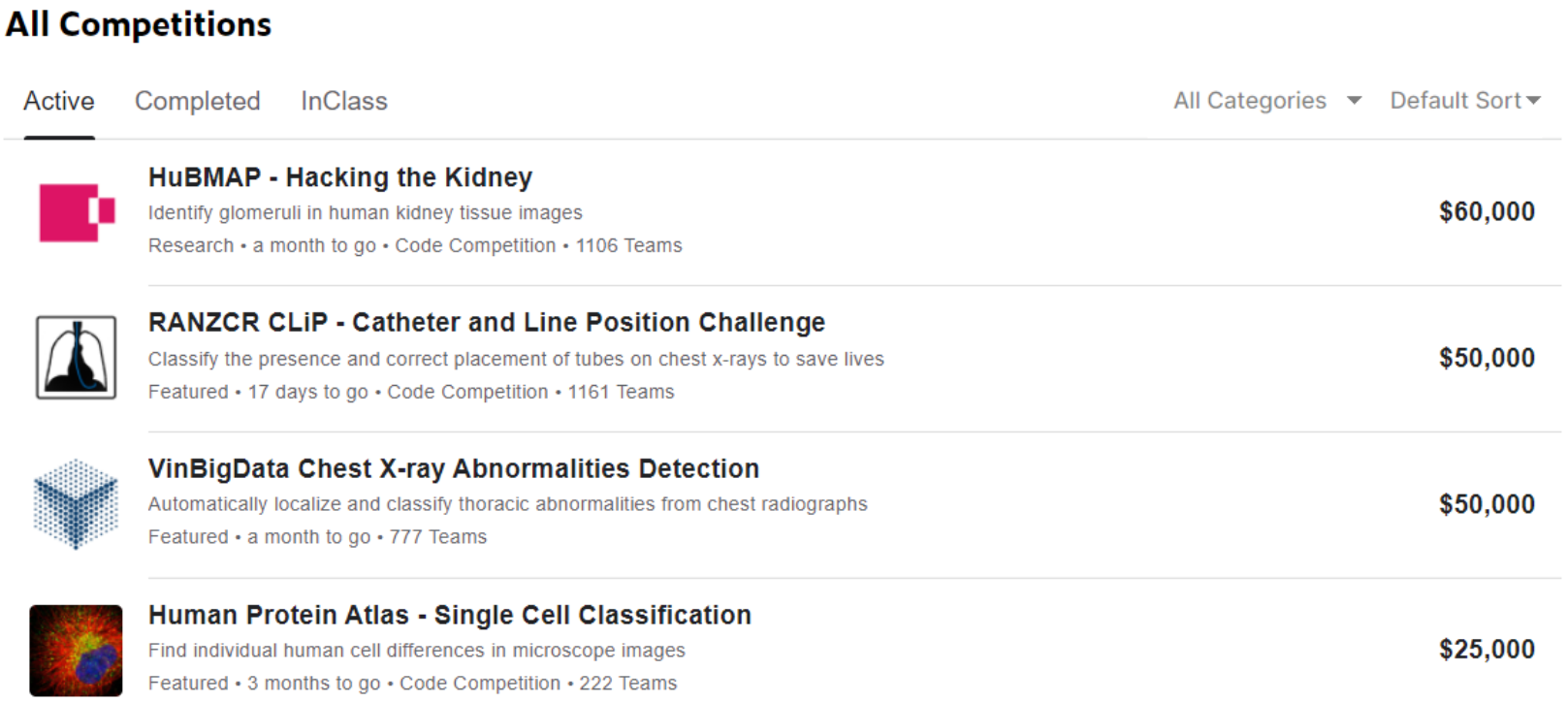
Join Competition

- To improve your skill of data analytics, you have to choose one of the competitions to join:
- Practice your data analytics skill : Kaggle/Aidea/TBrain
- Using data to create a service: 資料創新競賽
- If there are new competitions, I will announce.

- Additional Competition:
  - 水資料應用競賽: Write a proposal to propose a solution for water issue.
  - Help Industry solve the problem: AIGO (The end date of competition is in October)
- Of course, you can join all competitions.

Kaggle

- https://www.kaggle.com/competitions



AIdea

- https://aidea-web.tw/about

TBrain

- [T-Brain Machine Learning Competition (trendmicro.com.tw)]

資料創新競賽

- https://opendata-contest.tca.org.tw/

水資料應用競賽

https://iot.wra.gov.tw/IOTCompetition/

- 報名至**3/1**

（一） 競賽主題

競賽主題規劃以「穩定供水」、「水災防汛」、「河川安全」、「智慧決策」四大主題發想，參賽隊伍可以四大主題做延伸與發想，盼結合各界想法及各領域專長，激發如何運用水利相關資料發揮創意構想，以解決水利相關問題。

1. **穩定供水**

   水資源調度、水質監測、農業用水或民生用水等。

2. **水災防汛**

   淹水預警、防汛整合等。

3. **河川安全**

   堤防結構物安全、閘門安全等。

4. **智慧決策**

   水資源智慧調控、水利防災決策支援等。

AIGO

- https://aigo.org.tw/zh-tw/competitions

中揚光電

多樣性物料設備AI 取料分析優化

由我司自製開發物管設備，進行AI分析取料並加速取料流程，將內部放置物依據MES特殊需求，以AI提示推薦該次應使用的刀具或製具，並透過圖號及刀號這些資料訓練演算法，提高人員倉庫加工製程上的效率，與自我判斷排序整理模

593 隊伍申請：0-3 歡迎投件

台塑旭

彈性纖維橫斷面外觀AI品質辨識

目前彈性纖維橫斷面品質檢測是以顯微鏡放大顯像於螢幕上，以人工目視計算纖維條數後，再以尺規量測螢幕上之纖維直徑是否於管制範圍，整廠平均每天約有300張橫斷面影像需藉由上述方法以人工判讀，非常耗費人力及時間。本案

779 隊伍申請：0-3 歡迎投件

Lab and HW

- Please hand in Lab and HW on time.
- If you submit your homework late within 7 days, you will only get 85% of your score.
- If you submit your homework late within 14 days, you will only get 70% of your score.
- If you submit your homework late more than 14 days, you will get 0.

Grades

- **Lab and HW (28%):** 4% each for Labs
- **Proposal and First presentation (10%)**
- **Midterm (20%)**
- **Quiz (2%):** randomly happens, 1 pts each
- **Machine Test (10%)**
- **Final project (30%)**
- **Bonus : Off-campus competition (Up to 10 points.)**
  - When you join more than one competitions and you don't win the prize, you can get registration point and final contest point.
    - +1: Registration (Except Aidea.)
    - +2: Final Contest
  - +10: Award (1st prize)
  - +8: Award (2st prize)
  - +6: Award (3rd prize)
  - +4: Other prize

Final Project

Important Information

- Group member: 1-4
- Abstract (After midterm)
- Presentation (Slides and 2-min video)
- Report (English/Chinese)

Final Project Grade

- Abstract & Report (25%)
- Presentation score (20%-ranked by peers)
- Originality (15%)
- Performance (20%)
- 2-min video (20%)
- 10, 7, and 3 extra pts for the 1st, 2nd, and 3rd place of Most Popular Award (MPA), respectively

- Notice that the average scores BEFORE adding bonus for each project will be adjusted to approximately the same value.

Final Project Report

- A 5-page document describing your:
  - Motivation
  - Goal
  - State-of-the-art
  - Proposed Architecture and Methods
    - Uniqueness and Novelty
  - Dataset
  - Experiment Results/Interface
  - Conclusion
  - The job assignments between members
- Not include cover.
- Show that your ideas are worth efforts.

About the 2-min video

- Let viewers understand the novelty and contribution easily
- Target audience: non-ECE bachelor students
  - Please DO NOT stuff the video with technical terms
- An example: Please refer to the videos
- https://www.youtube.com/watch?time_continue=97&v=G-omu_ki7YM
- https://www.youtube.com/watch?v=hUnRCxnydCc

Spotlight Video List (1/2)

[1] RL for dodging game: https://youtu.be/4oz-mUb4Dgk
[2] Arrhythmia detection using 12 lead ECG based on Deep Learning: https://youtu.be/ZNf5X_f1CBo
[3] DeepFont: Identify Your Font from An Image: https://youtu.be/WRzvHUN6aMQ
[4] Intelligent Fault Detection of Rolling-Element Bearing with Deep Learning: https://youtu.be/WzKL3XS6pkQ
[5] Short Text Understanding Through Lexical Semantic Analysis for Keyword Search: https://youtu.be/c0e4Iuqp3rE

Spotlight Video List (2/2)

[6] Dope Learning: A Computational Approach to Rap Lyrics Generation: https://youtu.be/ghvE6JLVi08
[7] How FER makes money?: https://youtu.be/grT_-0Yc_mE
[8] Deep Recurrent Q-Learning for Partially Observable MDPs: https://youtu.be/zhrFWtADUo0
[9] Product recommendation with face recognition: https://youtu.be/bf0609NDQYM
[10] Deep Learning for Event-Driven Stock Prediction: https://youtu.be/cgyurMRSBuA
[11] Self-driving cars Simulation with EANN: https://youtu.be/1tUFju-aoj8
[12] Hate Speech Writer Mapper based on Political Views Motive: https://youtu.be/I87G5USDJg4
[13] Beautification: https://youtu.be/p78Y5tC2rUg

Should I take?

Pros	Cons
Familiar with Machine Learning	Heavy?
Your Own Final Projects	Exhausted?
Participation	Pop Quiz
Lab	Programing

Quiz, homework, project, please…

- Do not copy the others' homework
- Write your own code, please
- In project, please:
  - Work as a team
  - Contribute your ideas
  - Implement your part
  - Do join the discussions
- You can always come knock my door
  - I would be glad to help you

Questions

Let Me Know You

問卷1