期末報告事項

2023

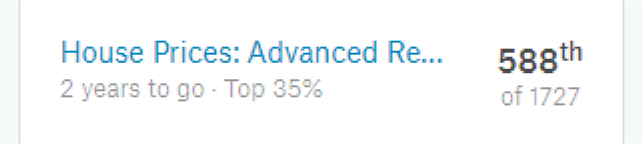
Machine Learning and Deep Learning

評分

- 期中考 – 30% (選擇題20題)
- 期末報告 – 60% (二選一): 5/2繳交名單
  - Python程式實作機器學習或深度學習 (不分組, 每位修課同學均要繳交期末報告與程式碼)
    - 題目可自選
  - 直接參與Kaggle競賽 (題目可於kaggle上自選, 或使用指定題, 仍要繳交期末報告與程式碼) (可組團, 1 ~ 3人)
- 課堂表現 – 10%

Top	0 – 20%	21 – 30%	31 – 40%	41 – 50%	51% - 60%	61 – 70%	71% -
成績	100	95	90	80	70	60	0

因kaggle上的成績會變動, 請上傳成績最好的top%截圖



學號與姓名	題目	是否為 kaggle 比賽	
		Yes	No
A1234 王小明 A1235 陳小華 A1236 王曉英	鐵達尼號生存預測	v	
A1237 林小花	Friday 顧客購物車分析		v

報告繳交

- 報告繳交日期: 2021年6月13 (期末考週)
- 繳交方式: 上傳ftp server
- 研究報告包括二個
  - 報告: pdf格式儲存, 第一頁為學號, 姓名及題目, 檔名為: 學號.pdf
  - 程式: 檔名為: 學號.ipynb
  - 若為kaggle比賽, 則在報告上附上比賽成績

期末報告
60%

資料集下載

- Kaggle
  - https://www.kaggle.com/
- • 政府開放資料平台
  - http://data.gov.tw/
- • 美國開放資料平台
  - https://www.data.gov/
- • 加州大學爾灣分校機器學習資料
  - http://archive.ics.uci.edu/ml/
- • Stanford Large Network Dataset Collection
  - https://snap.stanford.edu/data/
- Google Dataset Search
  - https://toolbox.google.com/datasetsearch

期末報告 60%

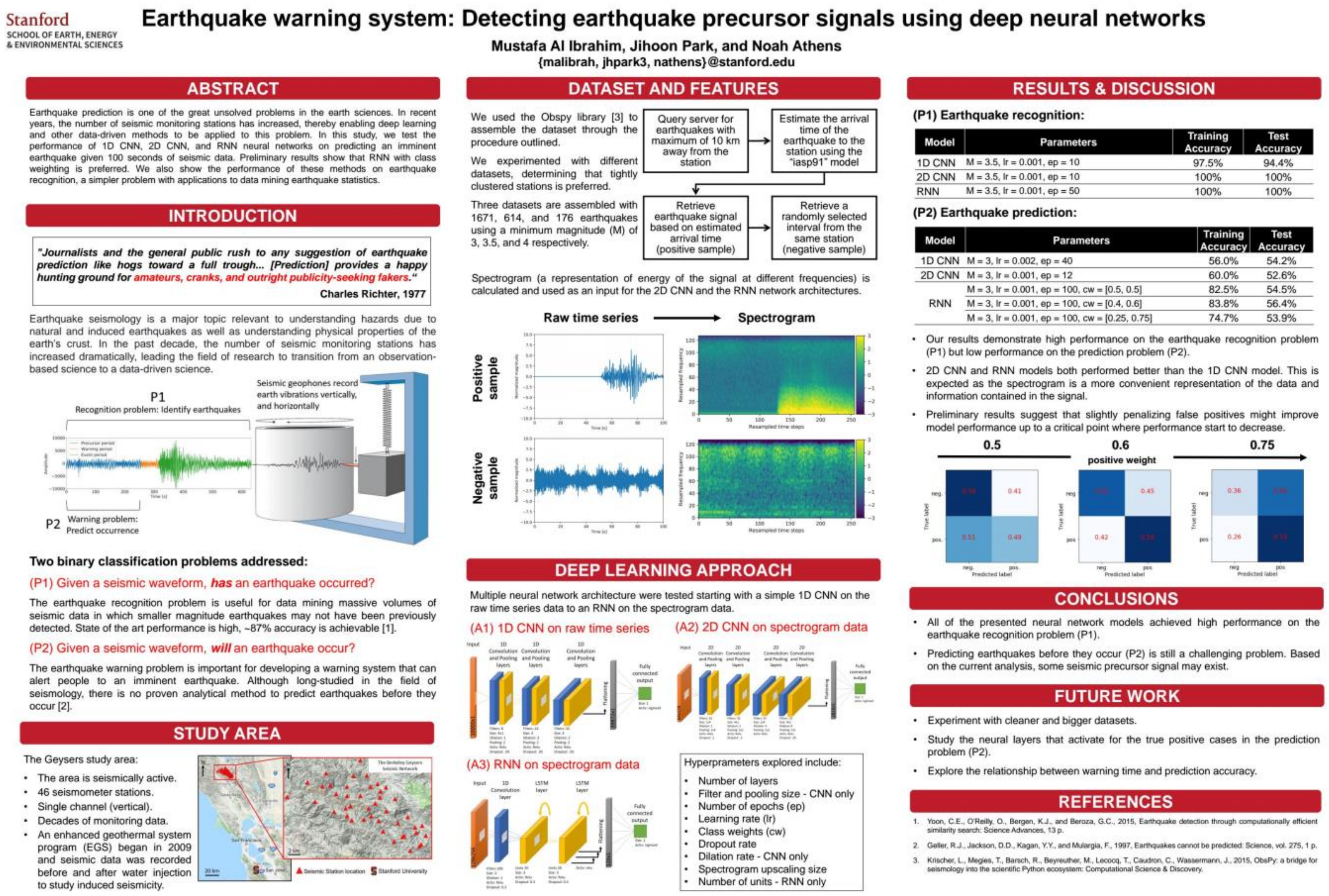
期末報告格式

- 摘要
- 介紹 (研究背景及研究目的)
- 資料集介紹(含資料特徵)及資料集來源
- 資料預處理
- 機器學習或深度學習方法 (使用何種方法)
- 研究結果及討論 (含模型評估與改善)
- 結論
- 參考文獻

期末報告
60%

期末報告
格式範例

Sample



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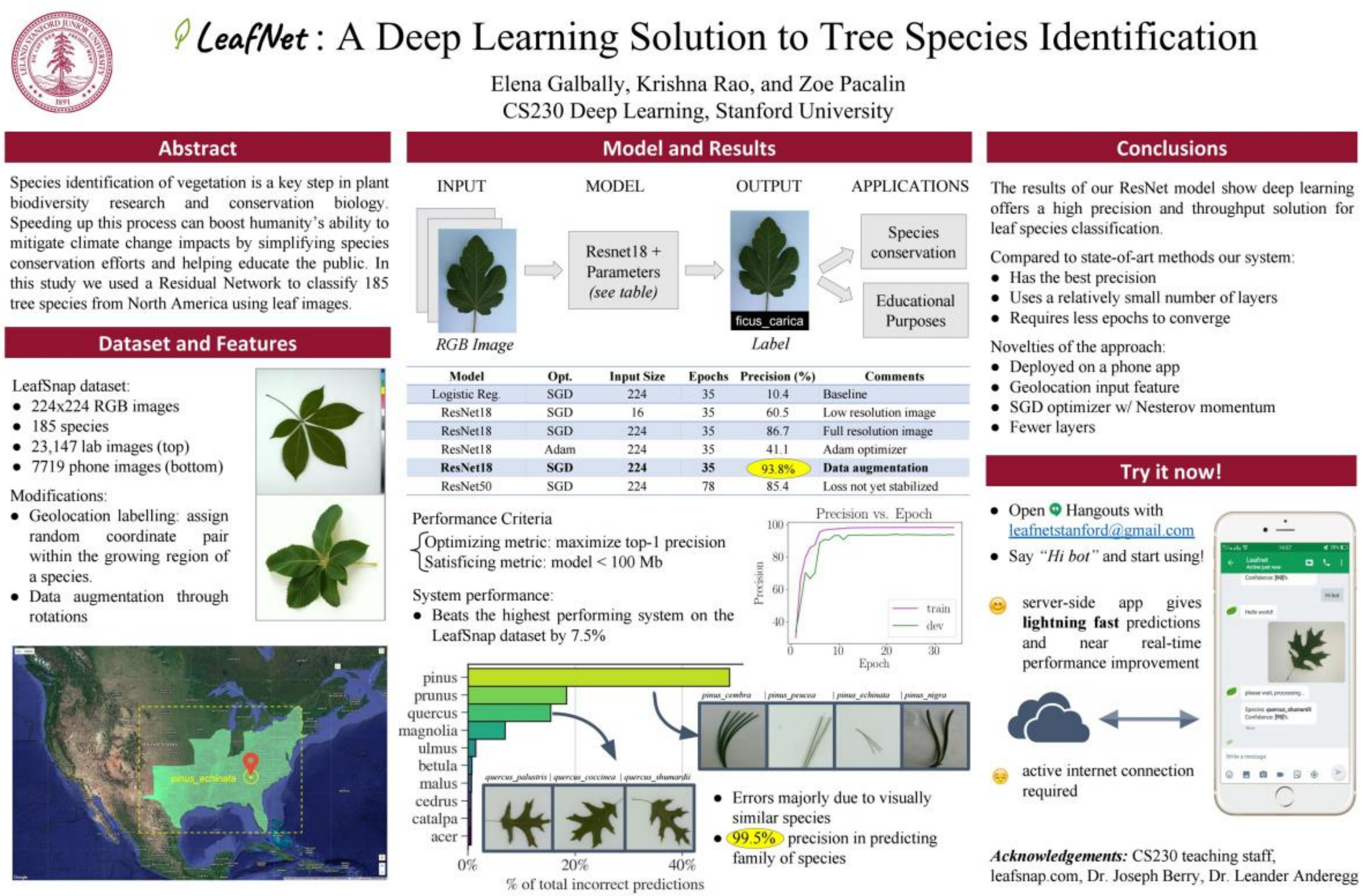
期末報告
格式範例

Sample


LeafNet: A Deep Learning Solution to Tree Species Identification

Elena Galbally, Krishna Rao, and Zoe Pacalin
CS230 Deep Learning, Stanford University

Abstract

Species identification of vegetation is a key step in plant biodiversity research and conservation biology. Speeding up this process can boost humanity's ability to mitigate climate change impacts by simplifying species conservation efforts and helping educate the public. In this study we used a Residual Network to classify 185 tree species from North America using leaf images.

Dataset and Features

LeafSnap dataset:
- 224x224 RGB images
- 185 species
- 23,147 lab images (top)
- 7719 phone images (bottom)

Modifications:
- Geolocation labelling: assign random coordinate pair within the growing region of a species.
- Data augmentation through rotations

pinus_echinata

Model and Results

INPUT | MODEL | OUTPUT | APPLICATIONS

RGB Image → Resnet18 + Parameters (see table) → ficus_carica Label → Species conservation / Educational Purposes

Model	Opt.	Input Size	Epochs	Precision (%)	Comments
Logistic Reg.	SGD	224	35	10.4	Baseline
ResNet18	SGD	16	35	60.5	Low resolution image
ResNet18	SGD	224	35	86.7	Full resolution image
ResNet18	Adam	224	35	41.1	Adam optimizer
ResNet18	**SGD**	**224**	**35**	93.8%	**Data augmentation**
ResNet50	SGD	224	78	85.4	Loss not yet stabilized

Performance Criteria
Optimizing metric: maximize top-1 precision
Satisficing metric: model < 100 Mb

System performance:
- Beats the highest performing system on the LeafSnap dataset by 7.5%

Precision vs. Epoch
Precision
Epoch
train
dev

pinus
prunus
quercus
magnolia
ulmus
betula
malus
cedrus
catalpa
acer
0% 20% 40%
% of total incorrect predictions

- Errors majorly due to visually similar species
- 99.5% precision in predicting family of species

Conclusions

The results of our ResNet model show deep learning offers a high precision and throughput solution for leaf species classification.

Compared to state-of-art methods our system:
- Has the best precision
- Uses a relatively small number of layers
- Requires less epochs to converge

Novelties of the approach:
- Deployed on a phone app
- Geolocation input feature
- SGD optimizer w/ Nesterov momentum
- Fewer layers

Try it now!

- Open Hangouts with leafnetstanford@gmail.com
- Say "Hi bot" and start using!

server-side app gives **lightning fast** predictions and near real-time performance improvement

active internet connection required

Acknowledgements: CS230 teaching staff, leafsnap.com, Dr. Joseph Berry, Dr. Leander Anderegg

Kaggle競賽

- **三選一**

- 波士頓房價預測
  - https://www.kaggle.com/c/house-prices-advanced-regression-techniques
- 鐵達尼號生存預測
  - https://www.kaggle.com/c/titanic
- 自選Competition on Kaggle


Kaggle
企業
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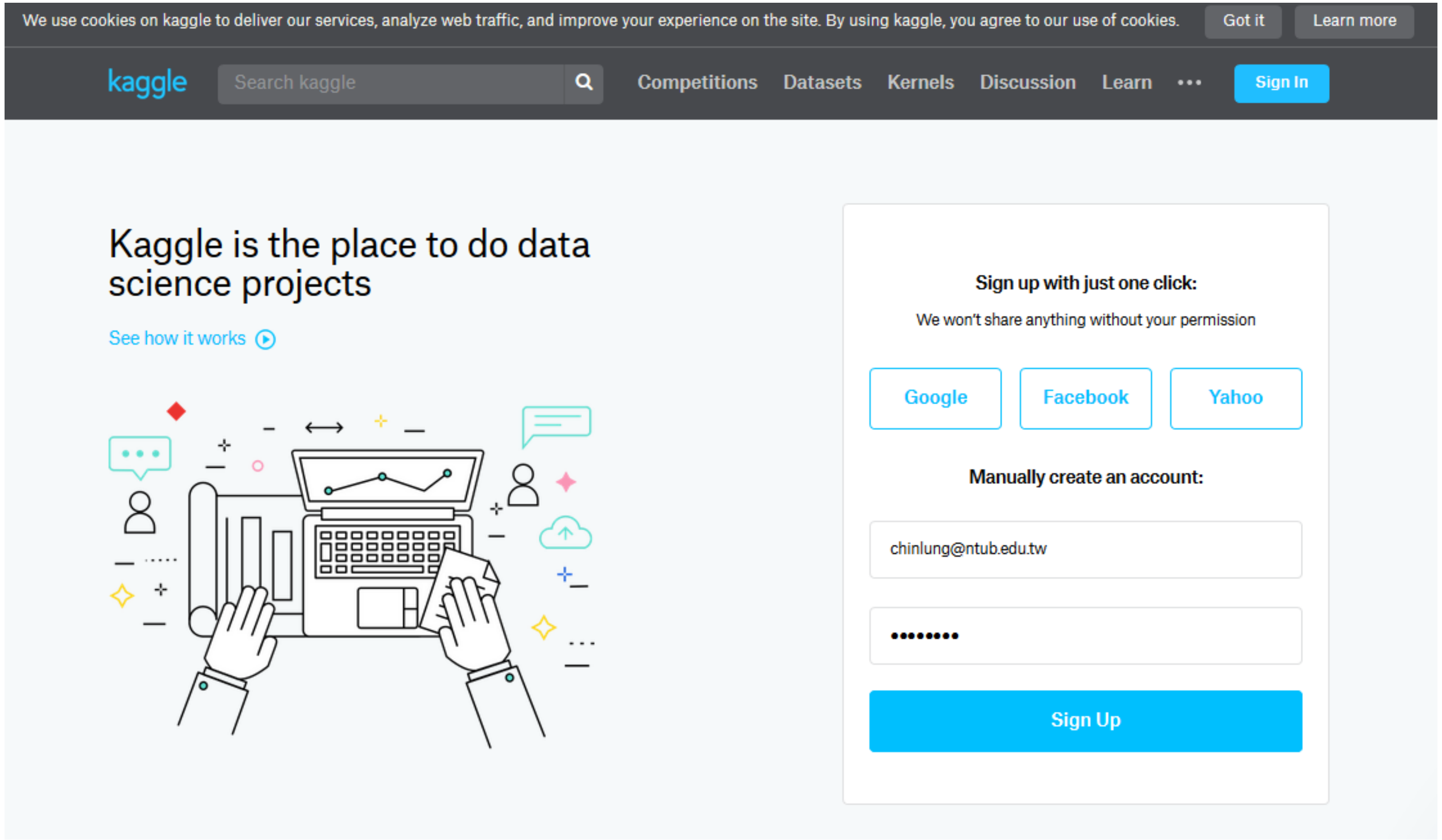
Kaggle是一個數據建模和數據分析競賽平台。企業和研究者可在其上發布數據，統計學者和數據挖掘專家可在其上進行競賽以產生最好的模型。這一眾包模式依賴於這一事實，即有眾多策略可以用於解決幾乎所有預測建模的問題，而研究者不可能在一開始就了解什麼方法對於特定問題是最為有效的。 維基百科
創辦人： 安東尼·戈德布盧姆
創立於： 2010 年 4 月
執行長： 安東尼·戈德布盧姆 (2010 年 4 月–)
總部： 美國加利福尼亞州舊金山
上級機構： Google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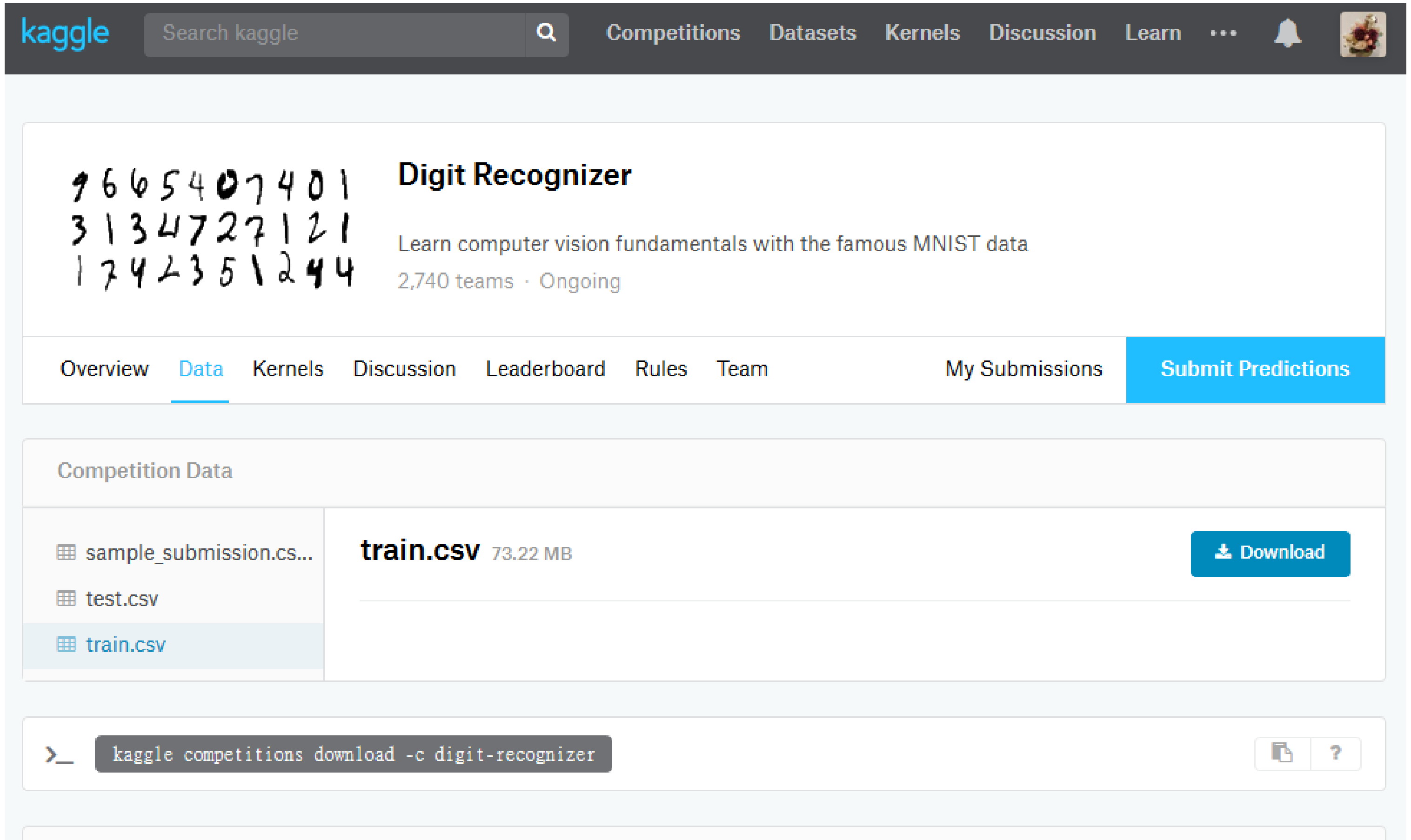
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Run Markdown

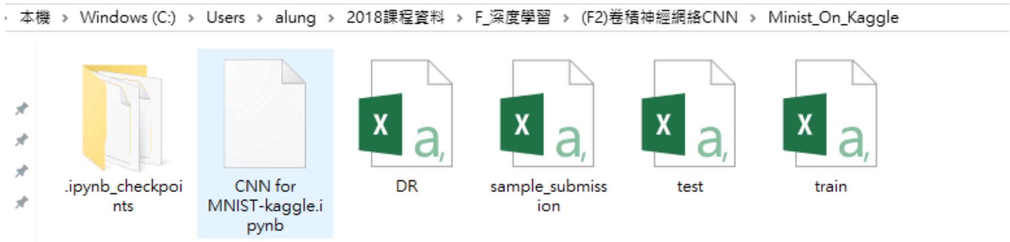
資料匯入與預處理

In [1]:
```python
import numpy as np
from keras.datasets import mnist

from keras.utils import np_utils
from keras.models import Sequential
from keras.layers import Dense, Activation, Conv2D, MaxPooling2D, Dropout, Flatten
```
```
Using TensorFlow backend.
```

In [2]:
```python
import pandas as pd
train = pd.read_csv('train.csv')
test = pd.read_csv('test.csv')
```

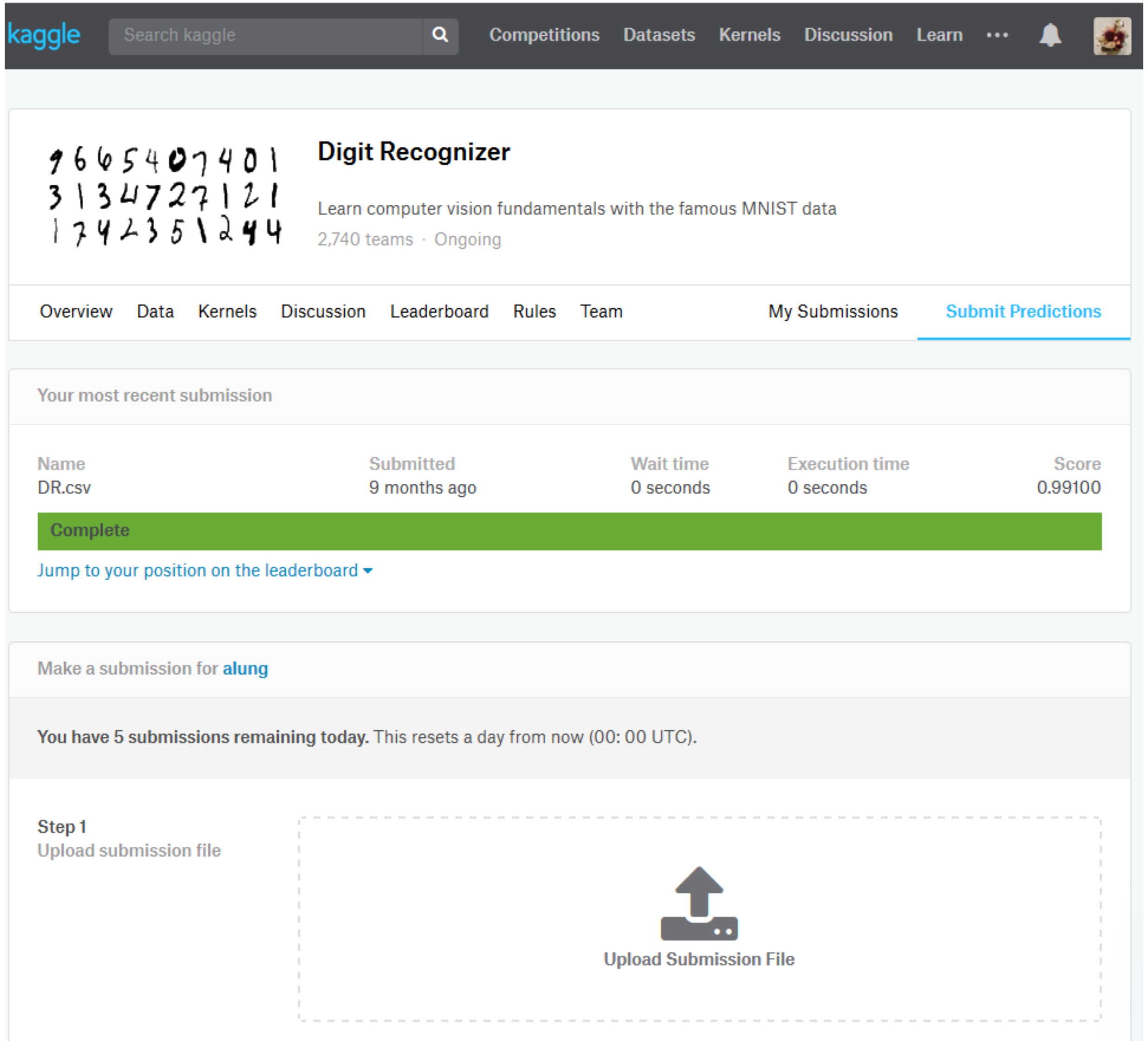
In [3]:
```python
X_train = (train.ix[:,1:].values).astype('float32') # all pixel values
y_train = train.ix[:,0].values.astype('int32') # only labels i.e targets digits
X_test = test.values.astype('float32')
```
```
C:\Users\alung\Anaconda3\envs\gpu\lib\site-packages\ipykernel_launcher.py:1: DeprecationWarning:
.ix is deprecated. Please use
.loc for label based indexing or
.iloc for positional indexing
```



In [29]:
```python
predictions = model.predict_classes(X_test, verbose=0)

submissions=pd.DataFrame({"ImageId": list(range(1,len(predictions)+1)),
                          "Label": predictions})
submissions.to_csv("DR.csv", index=False, header=True)
```

Kaggle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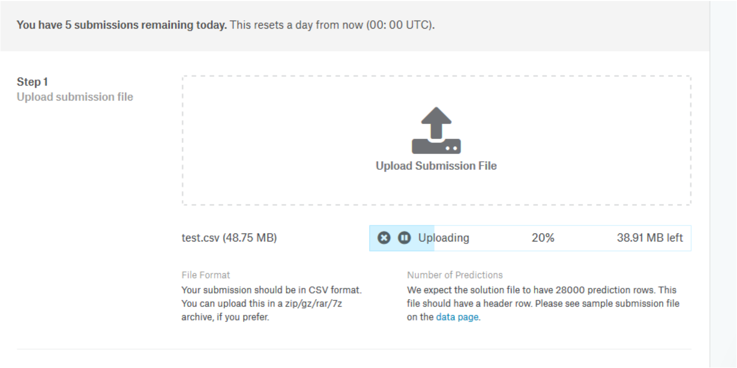
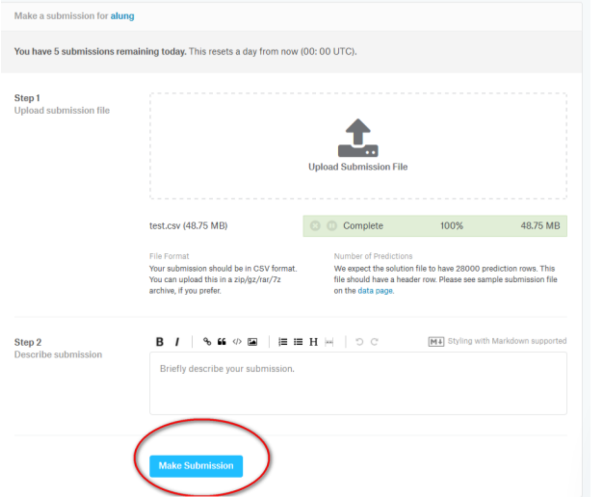
Leaderboard
Rules
Team
My Submissions
Submit Predictions
Your most recent submission
Name
DR.csv
Submitted
9 months ago
Wait time
0 seconds
Execution time
0 seconds
Score
0.99100
Complete
Jump to your position on the leaderboard
Make a submission for alung
You have 5 submissions remaining today. This resets a day from now (00: 00 UTC).
Step 1
Upload submission file
Upload Submission File

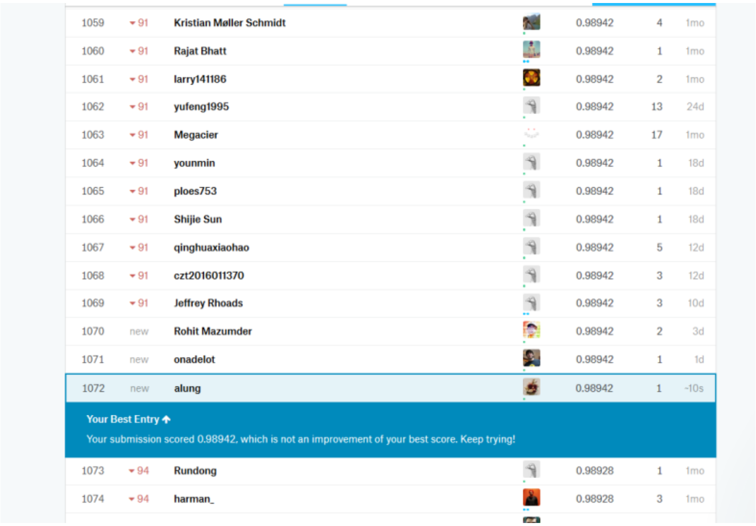
Kaggle



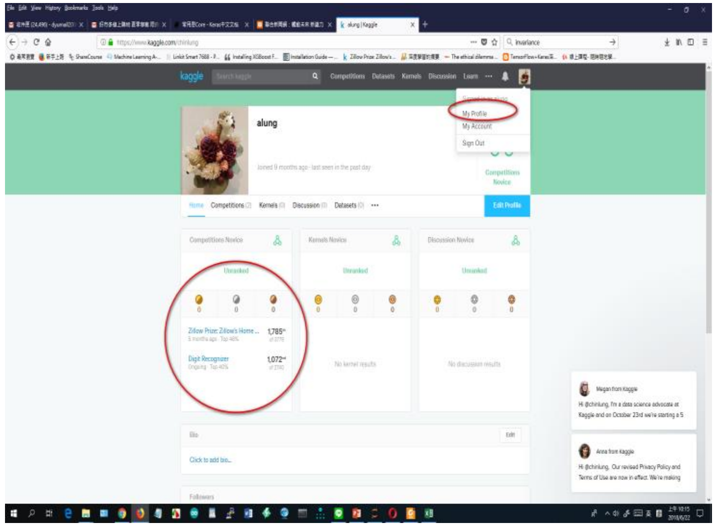
You have 5 submissions remaining today. This resets a day from now (00: 00 UTC).
Step 1
Upload submission file
Upload Submission File
test.csv (48.75 MB)
Uploading
20%
38.91 MB left
File Format
Your submission should be in CSV format. You can upload this in a zip/gz/rar/7z archive, if you prefer.
Number of Predictions
We expect the solution file to have 28000 prediction rows. This file should have a header row. Please see sample submission file on the data page.



Make a submission for alung
You have 5 submissions remaining today. This resets a day from now (00: 00 UTC).
Step 1
Upload submission file
Upload Submission File
test.csv (48.75 MB)
Complete
100%
48.75 MB
File Format
Your submission should be in CSV format. You can upload this in a zip/gz/rar/7z archive, if you prefer.
Number of Predictions
We expect the solution file to have 28000 prediction rows. This file should have a header row. Please see sample submission file on the data page.
Step 2
Describe submission
Styling with Markdown supported
Briefly describe your submission.
Make Submission



1059 ▾91 Kristian Møller Schmidt 0.98942 4 1mo
1060 ▾91 Rajat Bhatt 0.98942 1 1mo
1061 ▾91 larry141186 0.98942 2 1mo
1062 ▾91 yufeng1995 0.98942 13 24d
1063 ▾91 Megacier 0.98942 17 1mo
1064 ▾91 younmin 0.98942 1 18d
1065 ▾91 ploes753 0.98942 1 18d
1066 ▾91 Shijie Sun 0.98942 1 18d
1067 ▾91 qinghuaxiaohao 0.98942 5 12d
1068 ▾91 czt2016011370 0.98942 3 12d
1069 ▾91 Jeffrey Rhoads 0.98942 3 10d
1070 new Rohit Mazumder 0.98942 2 3d
1071 new onadelot 0.98942 1 1d
1072 new alung 0.98942 1 ~10s
Your Best Entry
Your submission scored 0.98942, which is not an improvement of your best score. Keep trying!
1073 ▾94 Rundong 0.98928 1 1mo
1074 ▾94 harman_ 0.98928 3 1mo



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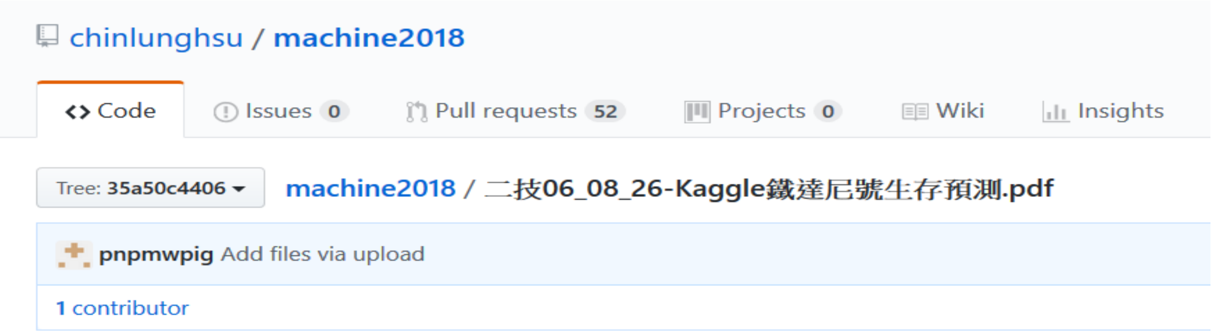
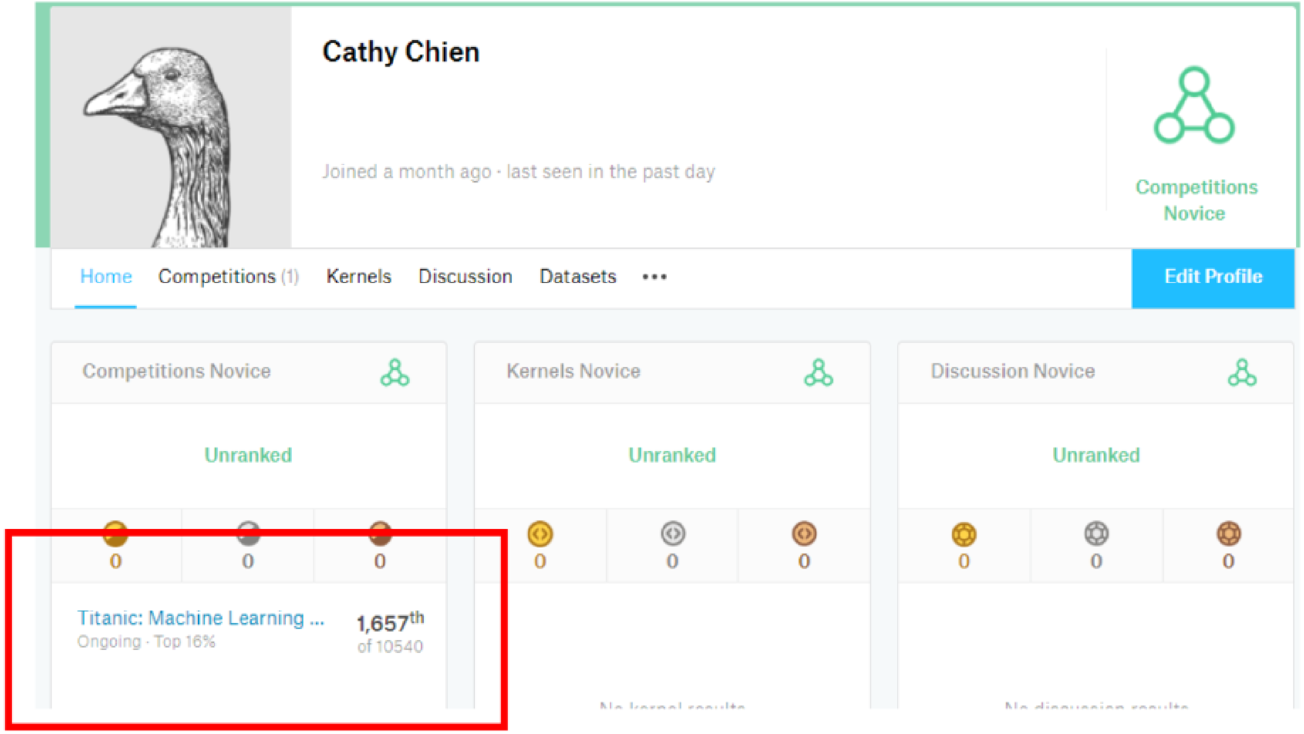
教學成果01



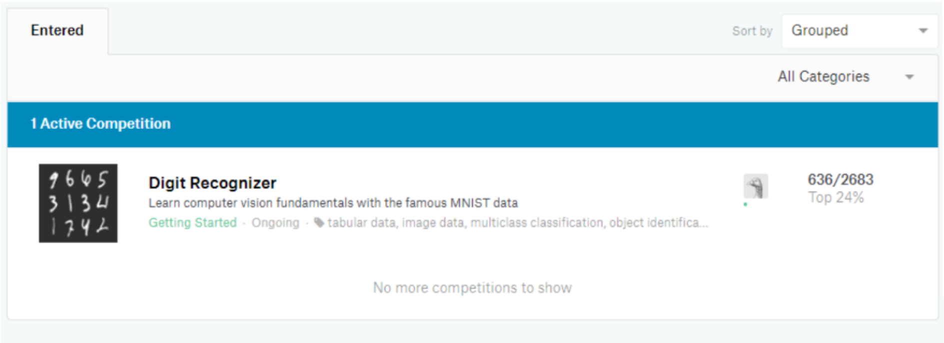
Kaggle 排名如下圖



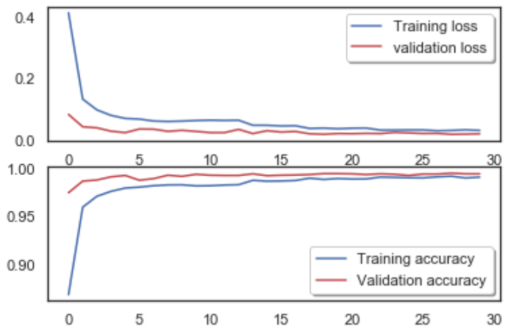
Result

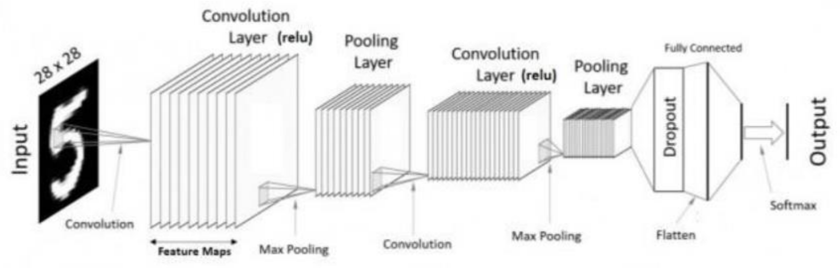
教學成果02

- Competition Ranking
  - 636/2683 Top 24%

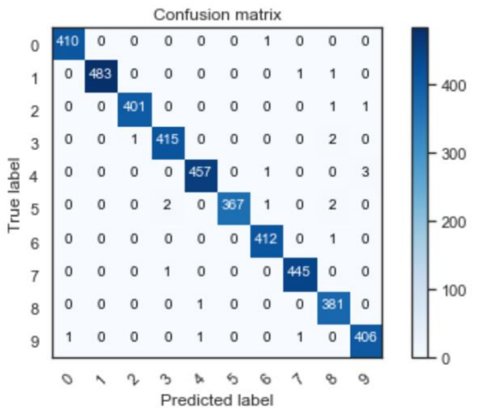


Train/Validation lost and accuracy





Confusion matrix



教學成果03

CHANGED 2 MONTHS AGO

摘要

在一學期的機器學習與深度學習課程後，於Kaggle平台上選定一資料集進行分析。

介紹

研究目的

本次選定 Black Friday 這個資料集，Black Friday 在美國用來指每年感恩節之後的第一天。這一天通常被認為標誌著聖誕購物期的正式開始，被看作是每年零售業聖誕銷售業績的晴雨表，也是一年中各個商家最看重也是最繁忙的日子之一。中文又稱作黑色購物節。

本次期望由 Kaggle上 的 dataset 進行機器學習與深度學習練習，並選定一種方法進行預測與建議。

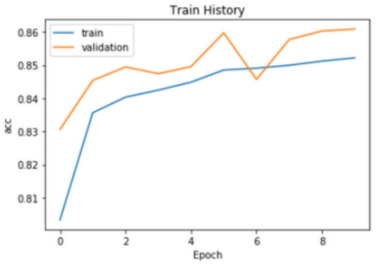
> The dataset here is a sample of the transactions made in a retail store. The store wants to know better the customer purchase behaviour against different products. Specifically, here the problem is a regression problem where we are trying to predict the dependent variable (the amount of purchase) with the help of the information contained in the other variables.
> ----截自Black Friday中的Description

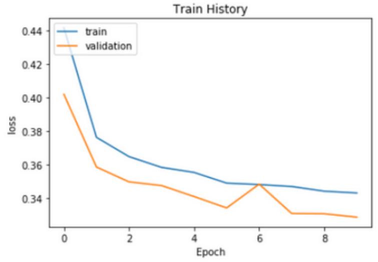
研究目標

- 分析資訊
  - 主要客群為男或女、結婚與否
- 回歸與分類，並預測
  - 試用回歸法預測購買量
  - 試用分類法預測是否為較高消費群

Expand all
Back to top
Go to bottom

```python
def show_train_history(train_history,train,validation):
    plt.plot(train_history.history[train])
    plt.plot(train_history.history[validation])
    plt.title('Train History')
    plt.ylabel(train)
    plt.xlabel('Epoch')
    plt.legend(['train', 'validation'], loc='upper left')
    plt.show()
show_train_history(train_history,'acc','val_acc')
show_train_history(train_history,'loss','val_loss')
```





https://hackmd.io/WlpaUcMzRDu1RUwWyvMf4g#