

# Machine Learning HW2

TAs

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# Outline

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- ❖ Provided Feature Format
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# Dataset and Task Introduction

## 1. Task: **Binary Classification**

Determine whether a person makes over 50K a year.

## 1. Dataset: **ADULT**

Extraction was done by Barry Becker from the 1994 Census database. A set of reasonably clean records was extracted using the following conditions:  
((AGE>16) && (AGI>100) && (AFNLWGT>1) && (HRSWK>0)).

## 1. Reference:

<https://archive.ics.uci.edu/ml/datasets/Adult>

# Data Attribute Information

## **train.csv** 、 **test.csv** :

age, workclass, fnlwgt, education, education num, marital-status, occupation  
relationship, race, sex, capital-gain, capital-loss, hours-per-week,  
native-country, make over 50K a year or not

```
1 39, State-gov, 77516, Bachelors, 13, Never-married, Adm-clerical, Not-in-family, White, Male, 2174, 0, 40, United-States, <=50K
2 50, Self-emp-not-inc, 83311, Bachelors, 13, Married-civ-spouse, Exec-managerial, Husband, White, Male, 0, 0, 13, United-States, <=50K
3 38, Private, 215646, HS-grad, 9, Divorced, Handlers-cleaners, Not-in-family, White, Male, 0, 0, 40, United-States, <=50K
4 53, Private, 234721, 11th, 7, Married-civ-spouse, Handlers-cleaners, Husband, Black, Male, 0, 0, 40, United-States, <=50K
5 28, Private, 338409, Bachelors, 13, Married-civ-spouse, Prof-specialty, Wife, Black, Female, 0, 0, 40, Cuba, <=50K
6 37, Private, 284582, Masters, 14, Married-civ-spouse, Exec-managerial, Wife, White, Female, 0, 0, 40, United-States, <=50K
7 49, Private, 160187, 9th, 5, Married-spouse-absent, Other-service, Not-in-family, Black, Female, 0, 0, 16, Jamaica, <=50K
8 52, Self-emp-not-inc, 209642, HS-grad, 9, Married-civ-spouse, Exec-managerial, Husband, White, Male, 0, 0, 45, United-States, >50K
```

❖ For more details please check out Kaggle Description Page

## Provided Feature Format

## X\_train, Y\_train, X\_test :

1. discrete features in train.csv => one-hot encoding in X\_train (work\_class,education...)
2. continuous features in train.csv => remain the same in X\_train (age,capital\_gain...)
3. X\_train, X\_test : each row contains one 106-dim feature represents a sample
4. Y\_train: label = 0 means " $\leq 50K$ " 、 label = 1 means " $>50K$ "

[illegible]

# Submission Format

請預測test set中16281筆資料

1. 上傳格式為csv
2. 第一行必須為id,label, 第二行開始為預測結果
3. 每行分別為id以及預測的label, 請以逗號分隔
4. Evaluation: Accuracy

```
1 id,label
2 1,0
3 2,0
4 3,0
5 4,1
6 5,0
7 6,1
8 7,1
9 8,1
10 9,0
11 10,0
```

# Requirements

1. 請**手刻** gradient descent 實作 logistic regression
2. 請**手刻**實作 probabilistic generative model
3. hw2\_logistic.sh、hw2\_generative.sh、hw2\_best.sh皆須在5分鐘內跑完
4. **Only Python 3.6 available !!!!**
5. hw2\_logistic.sh、hw2\_generative.sh 開放使用套件
  - a. numpy >=1.14
  - b. scipy == 1.2.1
  - c. pandas >= 0.24.1
  - d. python standard library
6. hw2\_best.sh不限做法, 開放以下套件(但有版本限制請注意)
  - a. pytorch == 1.0.1
  - b. tensorflow == 1.12.0
  - c. keras == 2.2.4
  - d. scikit-learn == 0.20.0
  - e. 不可以使用 xgboost, AdaBoostClassifier, ExtraTreesClassifier
7. 若需使用其他套件, 請儘早寄信至助教信箱詢問, 並請闡明原因。

# Kaggle

1. kaggle url: <https://www.kaggle.com/c/ml2019spring-hw2>
  2. 請使用作業一時創建的kaggle帳號登入。
  3. 個人進行, 不需組隊。
  4. 隊名:學號\_任意名稱(ex. b02902000\_日本一級棒), 旁聽同學請**避免**學號開頭。
  5. 每日上傳上限**5**次。
  6. test set的16281筆資料將被分為兩份, 8140筆public, 8141筆private。
  7. 最後的計分排名將以**2**筆自行選擇的結果, 測試在private set上的準確率為準。
- ★ kaggle名稱不符合規定者將不會得到任何kaggle上分數。



# Deadlines

1. Kaggle deadline: 2019/3/21 11:59:59 (GMT+8)
2. Github code & report deadline: 2019/3/22 23:59:59 (GMT+8)
3. 助教會在deadline一到就clone所有程式, 並且**不再重新clone任何檔案**

# Github Submissions

github上ML2019SPRING/hw2/裡面請至少包含：

1. report.pdf
2. hw2\_logistic.sh
3. hw2\_generative.sh
4. hw2\_best.sh

請不要上傳dataset, 請不要上傳dataset, 請不要上傳dataset

# Script Usage

bash ./hw2\_logistic.sh \$1 \$2 \$3 \$4 \$5 \$6                      output: your prediction

bash ./hw2\_generative.sh \$1 \$2 \$3 \$4 \$5 \$6                      output: your prediction

bash ./hw2\_best.sh \$1 \$2 \$3 \$4 \$5 \$6                      output: your prediction

\$1: raw data (train.csv)   \$2: test data (test.csv)

\$3: provided train feature (X\_train.csv)   \$4: provided train label (Y\_train.csv)

\$5: provided test feature (X\_test.csv)   \$6: prediction.csv

**上述提供的input大家可以不用全部都使用**  
**批改作業時會cd進同學的資料夾**

# Script Usage

助教執行範例：

```
bash ./hw2_logistic.sh /path/to/train.csv /path/to/test.csv /path/to/X_train  
/path/to/Y_train /path/to/X_test /path/to/prediction.csv
```

\$N 表示第N個argument, 助教在執行的時候會輸入相對路徑, **不可將路徑寫死**

# Score - Kaggle Rank

- ❖ Kaggle Deadline : 03/21/2019 11:59:59 (GMT+8)
- ❖ Early Baseline Point - 1%
  - 在 03/14/2019 23:59:59 (GMT+8) 前於 **public scoreboard** 通過 **simple baseline : 1%**
- ❖ Private Score Point - 4%
  - 以 03/21/2019 11:59:59 於 **public/private scoreboard** 之分數為準：
    - 超過public leaderboard的simple baseline分數：**1%**
    - 超過public leaderboard的strong baseline分數：**1%**
    - 超過private leaderboard的simple baseline分數：**1%**
    - 超過private leaderboard的strong baseline分數：**1%**
- ❖ Bonus - 1%
  - (1.0%) private leaderboard 排名前五名且於助教時間上台分享的同學

# Score - Reproduce

- ❖ Github code & report deadline: 2019/3/22 23:59:59 (GMT+8)
- ❖ 除了直接以Kaggle上的資訊評分外, 助教也會clone大家github上的程式來檢查
  - 執行程式時test data順序會shuffle過, 請勿直接輸出事先存取的答案。
  - hw2\_logistic.sh 或 hw2\_generative.sh的結果, 有一份必須在test set上超過 simple baseline, 才会有simple baseline的分數
  - 關於kaggle分數與reproduce結果的關係, 請參考 [Link](#)

# Score - Report

report.pdf:PDF (限制:不能超過2頁、請使用template作答)

- ❖ (1%) 請比較你實作的generative model、logistic regression的準確率, 何者較佳?
- ❖ (1%) 請說明你實作的best model, 其訓練方式和準確率為何?
- ❖ (1%) 請實作輸入特徵標準化(feature normalization), 並討論其對於你的模型準確率的影響。(有關normalization請參考:<https://goo.gl/XBM3aE>)
- ❖ (1%) 請實作logistic regression的正規化(regularization), 並討論其對於你的模型準確率的影響。(有關regularization請參考:<https://goo.gl/SSWGhf> P.35)
- ❖ (1%) 請討論你認為哪個attribute對結果影響最大?
- ❖ Report template:[Link](#)

# Score - Policy

## ❖ Other policy:

- 當**script格式錯誤**, 造成助教無法順利執行, 請在公告時間內寄信向助教說明, 修好之後重新執行所得kaggle部分分數將x0.7。
- 可以更改的部分僅限syntax及io的部分, 不得改程式邏輯或是演算法, 至於其他部分由助教認定為主。
- Kaggle超過deadline會直接shut down, 可以繼續上傳但不計入成績。
- Github遲交一天(\*0.7), 不足一天以一天計算, 不得遲交超過一天, 有特殊原因請找助教。**不接受程式or報告單獨遲交**
- Github遲交表單:[Link](#)  
(有遲交的同學才需填寫), 遲交時請「先上傳程式」到Github再填表單, 助教會根據表單填寫時間當作繳交時間。



# Score - Policy

## ❖ Cheating:

- 抄code、抄report (含之前修課同學)
- 開設kaggle多重分身帳號註冊competition
- 於訓練過程以任何不限定形式接觸到testing data的正確答案
- 不得上傳之前的kaggle競賽
- 教授與助教群保留請同學到辦公室解釋coding作業的權利, 請同學務必自愛

# FAQ

- 1. 如果只有做兩個方法是否需要繳交第三份script hw2\_best.sh ?

Ans: 是的。請把前兩個方法裡面較好的那份複製一份改名為hw2\_best.sh

- 若有其他問題, 請po在FB社團裡或寄信至助教信箱, **請勿直接私訊助教。**
- 助教信箱: [ntumlta2019@gmail.com](mailto:ntumlta2019@gmail.com)

# Link

- Kaggle
  - <https://www.kaggle.com/c/ml2019spring-hw2>
- 網頁
  - <https://ntumlta2019.github.io/ml-web-hw2/>