Machine Learning HW2

MLTAs
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Outline

- HW2 - Income 50K prediction
  - Dataset and Tasks Description
  - Provided Feature Format
  - Sample Submission
- Kaggle
- Grading / Assignment Regulation

Dataset and task introduction

- Dataset : Adult Data Set

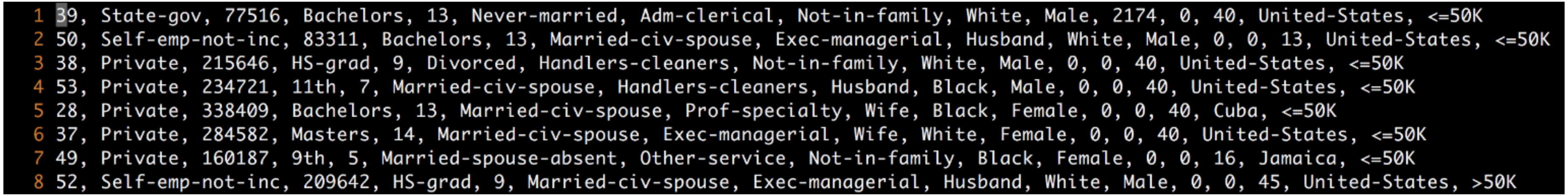
  Reference : https://archive.ics.uci.edu/ml/datasets/Adult

- Task : **Binary Classification**
  - **Logistic regression, Probabilistic generative model**

  Determine whether a person makes over 50K a year.

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



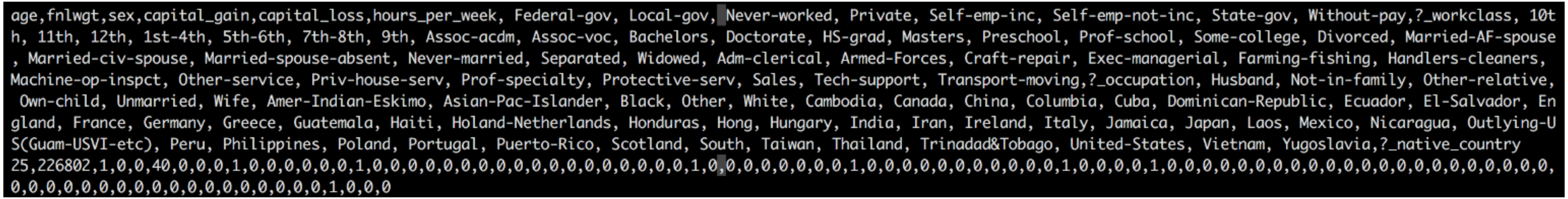
```
39, State-gov, 77516, Bachelors, 13, Never-married, Adm-clerical, Not-in-family, White, Male, 2174, 0, 40, United-States, <=50K
50, Self-emp-not-inc, 83311, Bachelors, 13, Married-civ-spouse, Exec-managerial, Husband, White, Male, 0, 0, 13, United-States, <=50K
38, Private, 215646, HS-grad, 9, Divorced,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

- More detail 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 “<= 50K” 、 label = 1 means “ >50K ”

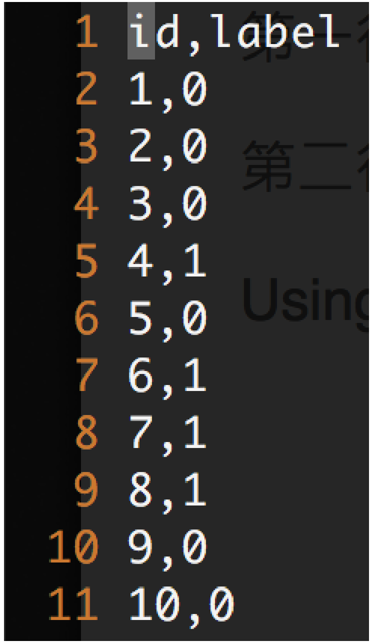


```
age,fnlwgt,sex,capital_gain,capital_loss,hours_per_week, Federal-gov, Local-gov, Never-worked, Private, Self-emp-inc, Self-emp-not-inc, State-gov, Without-pay,?_workclass, 10t
h, 11th, 12th, 1st-4th, 5th-6th, 7th-8th, 9th, Assoc-acdm, Assoc-voc, Bachelors, Doctorate, HS-grad, Masters, Preschool, Prof-school, Some-college, Divorced, Married-AF-spouse
, Married-civ-spouse, Married-spouse-absent, Never-married, Separated, Widowed, Adm-clerical, Armed-Forces, Craft-repair, Exec-managerial, Farming-fishing, Handlers-cleaners,
Machine-op-inspct, Other-service, Priv-house-serv, Prof-specialty, Protective-serv, Sales, Tech-support, Transport-moving,?_occupation, Husband, Not-in-family, Other-relative,
 Own-child, Unmarried, Wife, Amer-Indian-Eskimo, Asian-Pac-Islander, Black, Other, White, Cambodia, Canada, China, Columbia, Cuba, Dominican-Republic, Ecuador, El-Salvador, En
gland, France, Germany, Greece, Guatemala, Haiti, Holand-Netherlands, Honduras, Hong, Hungary, India, Iran, Ireland, Italy, Jamaica, Japan, Laos, Mexico, Nicaragua, Outlying-U
S(Guam-USVI-etc), Peru, Philippines, Poland, Portugal, Puerto-Rico, Scotland, South, Taiwan, Thailand, Trinadad&Tobago, United-States, Vietnam, Yugoslavia,?_native_country
25,226802,1,0,0,40,0,0,0,1,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1,0,0,0
```

Sample Submission

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



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

Kaggle Info & Deadline

- Link: ML2020fall HW2 Income prediction
- 個人進行、不須組隊
- Team Name:
  - 修課學生：**學號_任意名稱（ex: b09901666_大助好帥）**
  - 旁聽：旁聽_任意名稱
- Maximum Daily Submission: 5 times
- Simple Baseline Deadline: 10/23/2020 23:59:59 (GMT+8)
- Kaggle Deadline: 10/30/2020 23:59:59 (GMT+8)
- Github Deadline: 11/01/2020 23:59:59 (GMT+8)
- test set的16281筆資料將被分為兩份，8140筆public，8141筆private
- Leaderboard上所顯示為public score，在Kaggle Deadline前可以選擇2份submission作為private score的評分依據。

配分 Grading Criteria - kaggle (5% + Bonus 1%)

- Kaggle Deadline : 10/30/2020 23:59:59 (GMT+8)
- Early Baseline Point - 1%
  - 在 10/23/2020 23:59:59 (GMT+8) 前於 **public scoreboard** 通過 **early baseline : 1%**
- Private Score Point - 4%
  - 以 10/30/2020 23:59:59 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%**
  - 以上皆須通過 Reproduce 才給分
- Bonus - 1%
  - (1.0%) private leaderboard 排名前五名且於助教時間上台分享的同學

配分 Grading Criteria - report(5%)

- Programming Report - 2%
  - https://drive.google.com/file/d/1MaQFfxpnbDCfEkF1iij2aVJIYZT-GowJ/view?usp=sharing
- Math Problem - 3%
  - https://hackmd.io/@ASZWRvp7SjOEdYLqF3JYdg/H1T98sSvD
  - Type in latex(preferable) or take pictures of your handwriting
- Write them in report.pdf
- GitHub Classroom Link: https://classroom.github.com/a/pKodPOR3

配分 Grading Criteria - kaggle (5% + Bonus 1%)

- Kaggle Deadline : 10/30/2020 23:59:59 (GMT+8)
- Early Baseline Point - 1%
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- Private Score Point - 4%
  - 以 10/30/2020 23:59:59 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%**
  - 以上皆須通過 Reproduce 才給分
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  - Type in latex(preferable) or take pictures of your handwriting
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作業規定 Assignment Regulation

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 ==1.19.1
   b. scipy == 1.5.2
   c. pandas == 1.1.3
   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 == 1.6.0
   b. tensorflow == 2.2.0
   c. keras == 2.4.3
   d. scikit-learn == 0.23.2
   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。

Github Submissions

你的github上ML2020FALL/hw2/至少有下列4個檔案（格式必須完全一樣):

1. **hw2_logistic.sh** : handcraft "logistic regression" using Gradient Descent

2. **hw2_generative.sh** : handcraft "probabilistic generative model"

3. **hw2_best.sh** : meet the highest score you choose in kaggle

4. **report.pdf** : Please refer to report template

hw2_logistic.sh **or** hw2_generative.sh **should beat public simple baseline**

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

Shell script

助教在批改程式部分時，會執行以下指令：

```
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) $4: provided train label (Y_train)

$5: provided test feature (X_test) $6: ans.csv

上述提供的input大家可以不用全部都使用

Shell script

- 請務必在訓練過程中，隨時存取參數
- test data會 shuffle 過，請勿直接輸出事先存取的答案
- hw2 shell script 皆需要在 5 分鐘內執行完畢，否則該部分將以0分計算
- 切勿於程式內寫死輸入檔案是 output file 的路徑，否則該部分將以0分計算
- Script 所使用之模型，如 npy 檔、pickle 檔等，可以於程式內寫死路徑，助教會 cd 進 hw2 資料夾執行 reproduce 程序
- Conda file (同學可自行下載改prefix測試)

Report 格式

- 限制
  - 檔名必須為 report.pdf !!!
  - 檔名必須為 report.pdf !!!
  - 檔名必須為 report.pdf !!!
  - 請用中文撰寫report（非中文母語者可用英文）
  - 請標明系級、學號、姓名，並按照report模板回答問題，切勿隨意更動題號順序
  - 若有和其他修課同學討論，請務必於題號前標明collaborator（含姓名、學號）
- Report模板連結
  - 連結：Link
- 截止日期同 Github Deadline: 11/01/2020 23:59:59 (GMT+8)

其他規定 Other Policy

- Lateness
  - Github 每遲交一天(不足一天以一天計算) hw2 所得總分將x0.7
  - 不接受程式 or 報告單獨遲交
  - 不得遲交超過一天，若有特殊原因請儘速聯絡助教
  - Github 遲交表單: 遲交請先上傳遲交檔案至自己的 github 後再填寫遲交表單，助教群會以表單填寫時間作為繳交時間手動 clone 檔案。
- Script Error
  - 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。
  - 只能在助教面前更改你的 script。

其他規定 Other 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
  - 填寫前人的 github repo url
  - 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

TA Hour

- 10/23 助教課 手把手教學
- 10/20, 10/27 (Tue) @BL530
- 14:20 ~ 16:10