Machine Learning HW2

ML TAs
ntu-ml-2020spring-ta@googlegroups.com

Outline

- Task introduction and Dataset
- Feature Format and Submission Format
- Requirements

Task Introduction and Dataset

- Task: Binary Classification
  whether the income of an individual exceeds $50000 or not?

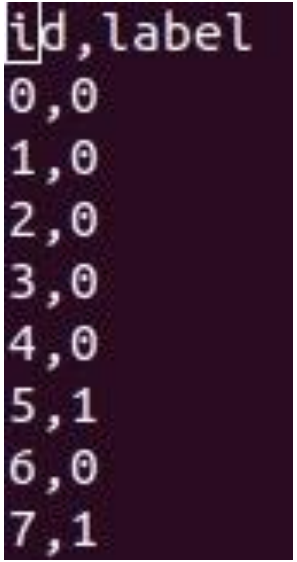
- Dataset: Census-Income (KDD) Dataset
  - remove unnecessary attributes and,
  - balance the ratio between positively and negatively labeled data.

Feature Format

- train.csv, test_no_label.csv
  - text-based raw data
  - unnecessary attributes removed, positive/negative ratio balanced.
- X_train, Y_train, X_test
  - discrete features in train.csv => one-hot encoding in X_train (education, martial state...)
  - continuous features in train.csv => remain the same in X_train (age, capital losses...).
  - X_train, X_test : each row contains one 510-dim feature represents a sample.
  - Y_train: label = 0 means “<= 50K” 、label = 1 means “ >50K ”

Submission Format

- 27622 instances of testing data
- First line: “id, label”
- Second line and thereafter: one “id, prediction” per line
- CSV(comma seperated values) format
- Evaluation metric: accuracy



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

Requirements

- hw2_logistic.sh: 請手刻 gradient descent 實作 logistic regression
- hw2_generative.sh: 請手刻實作 probabilistic generative model
- hw2_best.sh: 不限作法
- hw2_logistic.sh, hw2_generative.sh, hw2_best.sh 皆須在 5 分鐘內跑完
- Please refer to link for allowed toolkits.
- Any open-sourced code is forbidden (e.g. Implementation of decision tree you find on GitHub).
- Ask if you want to use other toolkits before using them!!!

Kaggle

- Kaggle competition: https://www.kaggle.com/c/ml2020spring-hw2
- Public simple baseline(1%): 0.88617
- Public strong baseline(1%): 0.89247
- Private baselines(2%): will be announced after Kaggle deadline.
- Kaggle scores will be counted if and only if the results can be reproduced by your GitHub code.

GitHub Submissions

- The “hw2-<account>” directory on GitHub should contain at least (but not limited to) the following files:
    - report.pdf
    - hw2_logistic.sh
    - hw2_generative.sh
    - hw2_best.sh
- Please DO NOT upload the 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 training data (train.csv) $2: raw testing data (test_no_label.csv)
- $3: preprocessed training feature (X_train) $4: training label (Y_train)
- $5: preprocessed testing feature (X_test) $6: output path (prediction.csv)
- You do not need to use all of the arguments in your bash scripts.
- The TA will cd into the directory of your scripts before executing them.

Script Usage

- Example:
  - TA@TA's Computer: ~/....../b08940587$ 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
- 不要寫死路徑 不要寫死路徑 不要寫死路徑
- 助教會把相對路徑帶入 $N 所以:
  不要寫死路徑 不要寫死路徑 不要寫死路徑

Reproducing Results

- Kaggle score will be counted if and only if the results can be reproduced by your GitHub code!!!
- Simple baselines: must be reproduced with hw2_logistic.sh or hw2_generative.sh
- Strong baselines: must be reproduced with with hw2_logistic.sh, hw2_generative.sh, or hw2_best.sh
- Only error less than **1%** can be accepted
  - For example, if your Kaggle score is 0.87, the accuracy of the result of your GitHub code should be at least 0.87*0.99=0.8613.
- Please always fix the random seeds in your code.

Report

- 請比較實作的 generative model 及 logistic regression 的準確率，何者較佳？請解釋為何有這種情況？

- 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。接著嘗試對正規項使用不同的權重 (lambda)，並討論其影響。(有關 regularization 請參考 https://goo.gl/SSWGhf p.35)

Report

- 請說明你實作的 best model，其訓練方式和準確率為何？

- 請實作輸入特徵標準化 (feature normalization)，並比較是否應用此技巧，會對於你的模型有何影響。

Links

- Data: https://bit.ly/2wI4i9n
- Kaggle: https://www.kaggle.com/c/ml2020spring-hw2
- Colab: https://bit.ly/32D5h6B
- Report template: https://bit.ly/32CIs2U
- 遲交表單: https://bit.ly/39d2x2m