CS498AML_HW1_panz2

PanZhang

Part 1A

```
accuracies
##  [1] 0.7364865 0.6333333 0.6891892 0.7241379 0.7089552 0.6609195 0.6751592
##  [8] 0.5987261 0.6709677 0.7304965
ave_accuracy=mean(accuracies)
ave_accuracy
## [1] 0.6828371
```

Part 1B

```
accuracies
##  [1] 0.6566265 0.6927711 0.6556291 0.7161290 0.6870748 0.6772152 0.6515152
##  [8] 0.6397059 0.6274510 0.6993007
ave_accuracy=mean(accuracies)
ave_accuracy
## [1] 0.6703418
```

Part 1D

```
accuracies
##  [1] 0.8333333 0.7880795 0.7101449 0.7450980 0.8383234 0.7619048 0.7122302
##  [8] 0.7727273 0.7352941 0.7484277
mean(accuracies)
## [1] 0.7645563
```

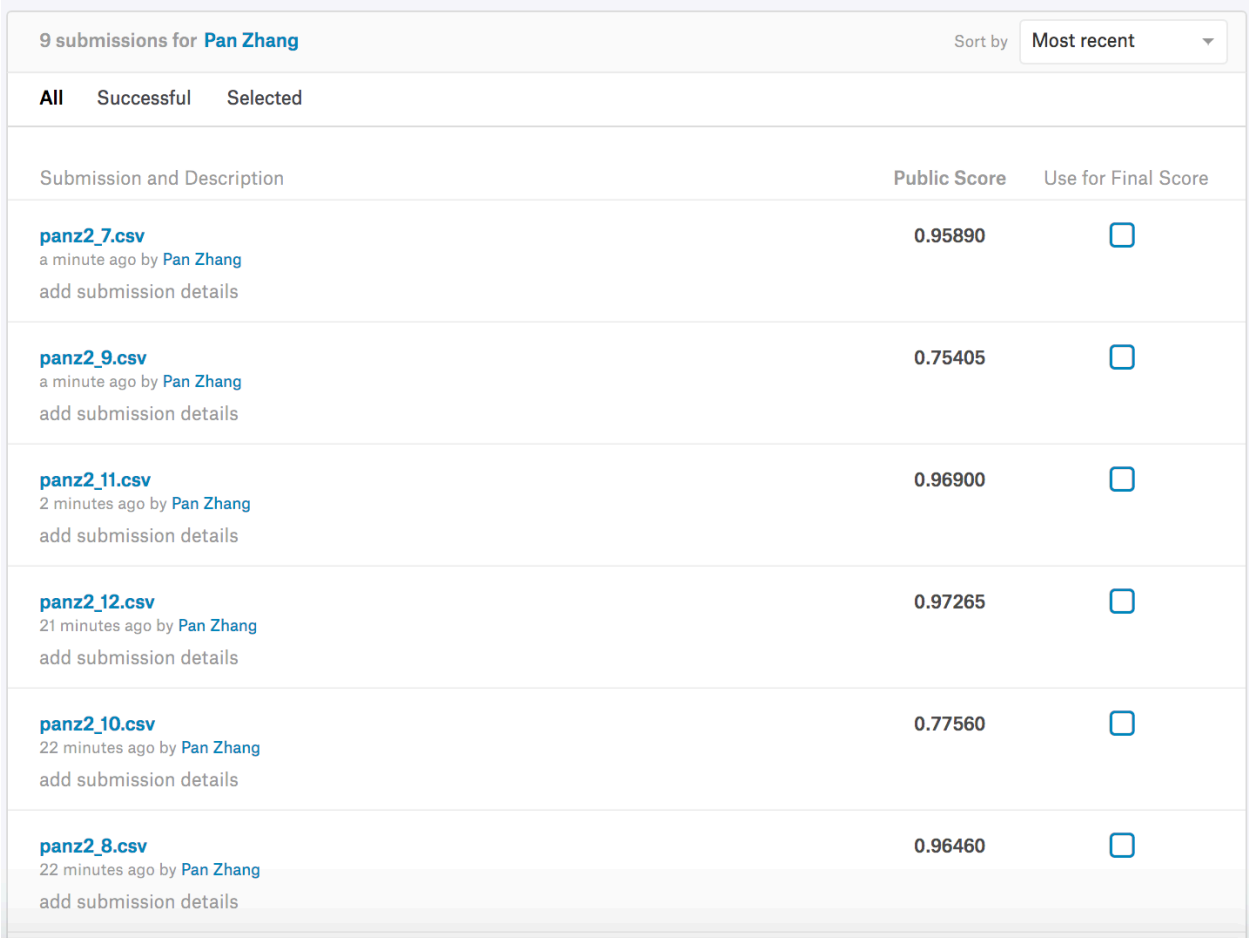
Code:

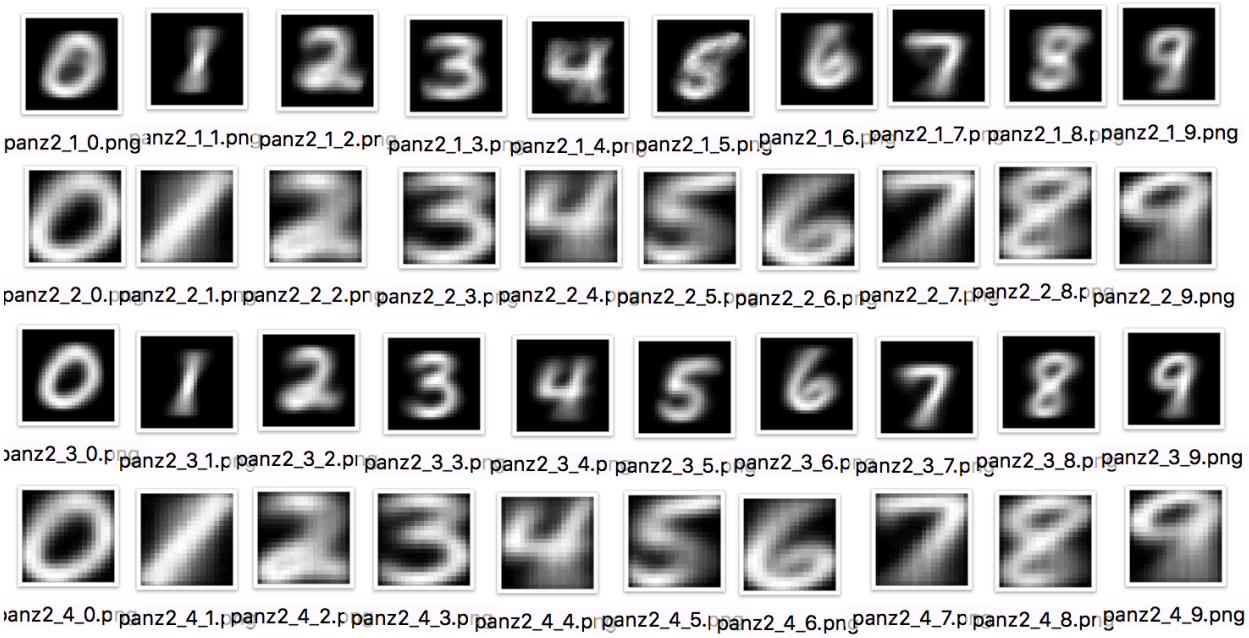
```
naivebayes_update = function (datafr){
  #split data into train and test
  index=sample(2, nrow(datafr), replace=T, prob=c(0.8,0.2))
  data.train <- data[index==1, ]
  dim(data.train)
  data.test <- data[index==2, ]
  dim(data.test)
  #calculate posterior and class-conditional distributions
  labels=data.train[,ncol(datafr)]
  num_feature = ncol(datafr)-1
  label = unique(labels)
  feature = array(NA,dim=c(length(label),num_feature,2))
  priori = array(NA,rep(length(label)))
  for (i in 1:length(label)){
    label_class_sum = length(labels[labels==label[i]])
    priori[i] = label_class_sum/length(labels)
    attrs_condition = data.train[which(data.train$X1==label[i]),]
    for (j in 1:num_feature){
      attrs=attrs_condition[,j]
      #calculate mean and sd for each attribute
      feature[i,j,1]= mean(attrs,na.rm=TRUE)
```

```
      feature[i,j,2]= sd(attrs,na.rm=TRUE)
      #here we caculate mean and sd with NA removed.
    }
  }
  #apply mode to test data
  right_class=0
  for (k in 1:nrow(data.test)){
    p=array(NA,dim=c(length(label),num_feature))
    result=array(NA,rep(length(label)))
    for (i in 1:length(label)){
      for (j in 1:length(num_feature)){
        if (data.test[k,j]==FALSE){
          p[i][j]=1  }
        else{ p[i][j]=dnorm(data.test[k,j], feature[i,j,1],feature[i,j,2])}
        if (j==1){result[i]= p[i][j]}
        else{result[i]=result[i]*p[i][j]}
      }
      result[i]=result[i]*priori[i]
    }
    my_lable=label[which.max(result)]
    if (data.test[k,ncol(datafr)] == my_lable){
      right_class = right_class + 1
    }
  }
  accuracy=right_class/nrow(data.test)
  return (accuracy)
}
```

```
SVMlight:
accuracies= array(NA,rep(10))
for (i in 1:10){
  index=sample(2, nrow(data_svm), replace=T, prob=c(0.8,0.2))
  data_svm.train <- data[index==1, ]
  dim(data_svm.train)
  data_svm.test <- data[index==2, ]
  dim(data_svm.test)
  svm = svmlight(data_svm.train[,1:8], factor(data_svm.train[,9]), pathsvm="/
Users/panzhang/Desktop/CS498AML/svm_light/")
  labels = predict(svm, data_svm.test[,1:8])
  answers = labels$class
  #accuracy
  correct <- sum(answers == data_svm.test[,9])
  accuracies[i] = correct / nrow(data_svm.test)
}
accuracies
```

x	Method	Accuracy
1	Gaussian + untouched	0.533
2	Gaussian + stretched	0.816
3	Bernoulli + untouched	0.837
4	Bernoulli + stretched	0.801
5	10 trees + 4 depth + untouched	0.718
6	10 trees + 4 depth + stretched	0.73
7	10 trees + 16 depth + untouched	0.9655
8	10 trees + 16 depth + stretched	0.972
9	30 trees + 4 depth + untouched	0.7605
10	30 trees + 4 depth + stretched	0.7545
11	30 trees + 16 depth + untouched	0.979
12	30 trees + 16 depth + stretched	0.9805





Code:

```
import numpy as np
import scipy.misc
from pandas import Series, DataFrame
from sklearn.naive_bayes import GaussianNB
from sklearn.naive_bayes import BernoulliNB
from sklearn.metrics import accuracy_score
from sklearn.ensemble import RandomForestClassifier
from sklearn.feature_extraction import DictVectorizer
import matplotlib.pyplot as plt
import matplotlib.cm as cm
import string
```

```
#GaussianNB
model = GaussianNB()
model.fit(untouched_train_X, untouched_train_Y)
score=model.score(untouched_val_X,untouched_val_Y)
print(score)
predict = model.predict(untouched_test_X)
```

```
model.fit(stretched_train_X, stretched_train_Y)
score=model.score(stretched_val_X, stretched_val_Y)
print(score)
predict = model.predict(stretched_test_X)
```

```
#BernoulliNB
model = BernoulliNB()
model.fit(untouched_train_X, untouched_train_Y)
score=model.score(untouched_val_X,untouched_val_Y)
print(score)
predict = model.predict(untouched_test_X)
```

```
model.fit(stretched_train_X, stretched_train_Y)
score=model.score(stretched_val_X, stretched_val_Y)
print(score)
predict = model.predict(stretched_test_X)
```

```
#RandomForest
model= RandomForestClassifier(n_estimators=10, max_depth=4)
model.fit(untouched_train_X, untouched_train_Y)
score=model.score(untouched_val_X,untouched_val_Y)
print(score)
predict = model.predict(untouched_test_X)
```

```
model= RandomForestClassifier(n_estimators=10, max_depth=16)
model.fit(untouched_train_X, untouched_train_Y)
score=model.score(untouched_val_X,untouched_val_Y)
print(score)
predict = model.predict(untouched_test_X)
```

```
model= RandomForestClassifier(n_estimators=30, max_depth=4)
model.fit(untouched_train_X, untouched_train_Y)
score=model.score(untouched_val_X,untouched_val_Y)
print(score)
predict = model.predict(untouched_test_X)
```

```
model= RandomForestClassifier(n_estimators=30, max_depth=16)
model.fit(untouched_train_X, untouched_train_Y)
score=model.score(untouched_val_X,untouched_val_Y)
print(score)
predict = model.predict(untouched_test_X)
```