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# Text Mining Final-Project by Thomas Wagner, Alexander Allen, MingYi Wang

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## Input Data

```
clear all
close all

% load 10% sample data and the test data
load DDISample.mat

% convert to normal format instead of sparse
Classp_train=full(Classp_train);
Classm_train=full(Classm_train);
Classp_test=full(Classp_test);
Classm_test=full(Classm_test);
```

## PCA on data

```
Train_total = [Classp_train; Classm_train];

[m, np] = size(Classp_train); % size for Classp
[nm, nm] = size(Classm_train); % size for Classm
[m, n] = size(Train_total); % size for total

train_mean = (1/m)*(ones(1,m)*Train_total);

Train_total2 = Train_total - ones(m,1)*train_mean;

[eigenvectors, scores, eigenvalues] = pca(Train_total);

explainedVar = cumsum(eigenvalues./sum(eigenvalues) * 100)
figure
bar(explainedVar)
```

*explainedVar* =

7.2915  
13.2214  
17.3786  
20.6507  
23.2084  
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27.4094  
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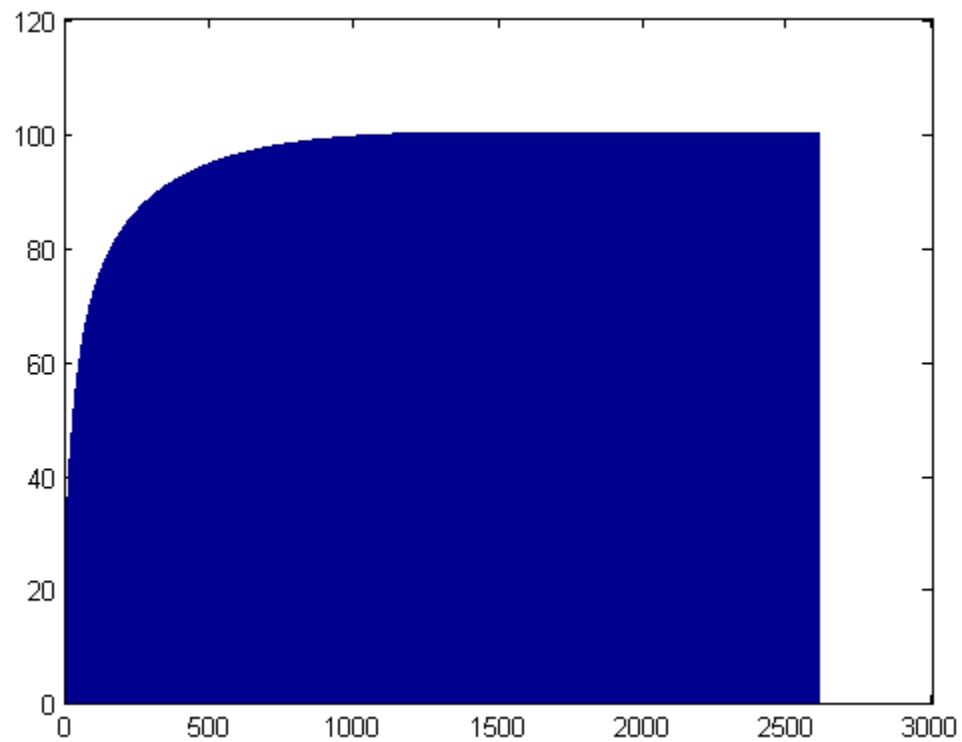
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```
trimmed_scores = scores(:,1:300);  
classp_scores = trimmed_scores(1:mp,:);  
classm_scores = trimmed_scores(mp+1:m,:);
```

## Fisher

```
meanp=mean(classp_scores);  
meanm=mean(classm_scores);  
  
psize=size(classp_scores,1)  
nsize=size(classm_scores,1)  
Bp=classp_scores-ones(psize,1)*meanp;  
Bn=classm_scores-ones(nsize,1)*meanm;
```

```
Sw=Bp'*Bp+Bn'*Bn;
wfisher = Sw\ (meanp-meanm)';
wfisher=wfisher/norm(wfisher);

tfisher=(meanp+meanm)./2*wfisher
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

% Analyze training data  results of the Fisher Linear Discriminant

FisherPosErrorTrain = sum(classp_scores*wfisher <= tfisher);
FisherNegErrorTrain = sum(classm_scores*wfisher >= tfisher);

FisherTrainError= ((FisherPosErrorTrain + FisherNegErrorTrain)/(size(trimmed_score

% Histogram of Fisher Training Results
HistClass(classp_scores,classm_scores,wfisher,tfisher,...
    'Fisher Method Training Results',FisherTrainError);

    psize =

        380

    nsize =

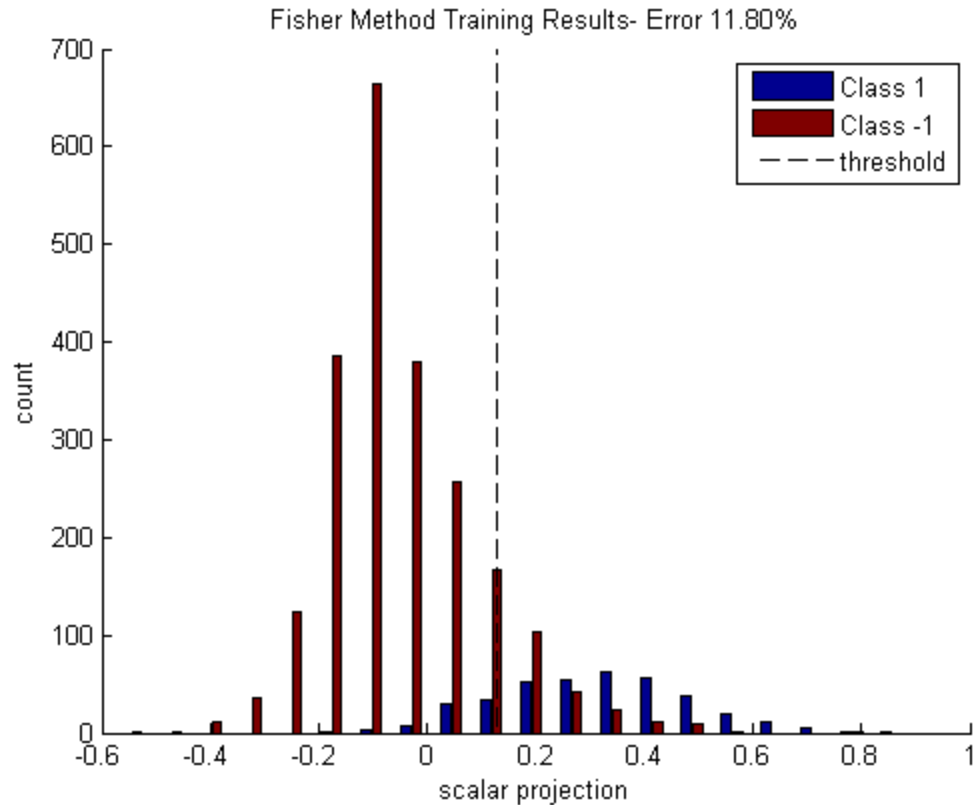
        2221

    tfisher =

        0.1283

    FisherTrainError =

        0.1180
```



## Top 30 words

```
A = Train_total' * trimmed_scores * wfisher;  
absA = abs(A);  
  
words = cell(30,1);  
word_values = zeros(30,1);  
  
for i = 1:30  
    [M,I] = max(absA);  
    words(i,1) = featurenames(I,1);  
    word_values(i,1) = A(I,1);  
    absA(I,1) = 0;  
end
```

## Compute test scores

```
Test_total = [Classp_test; Classm_test];  
  
[mp_test,np_test] = size(Classp_test); % size for Classp  
[mm_test,nm_test] = size(Classm_test); % size for Classm  
[m_test,n_test] = size(Test_total); % size for total  
  
Test_total2 = Test_total - ones(m_test,1)*train_mean;  
Classp_test2 = Test_total2(1:mp_test,:);
```

```
Classm_test2 = Test_total2((mp_test+1):end,:);

Classm_test_scores = Classm_test2 * eigenvectors;
Classp_test_scores = Classp_test2 * eigenvectors;

scores_test_total = [Classp_test_scores; Classm_test_scores];

trimmed_scores_test = scores_test_total(:,1:300);
classp_test_scores = trimmed_scores_test(1:mp_test,:);
classm_test_scores = trimmed_scores_test(mp_test+1:m_test,:);
```

## Fisher on Test

```
FisherPosErrorTest = sum(classp_test_scores*wfisher <= tfisher);
FisherNegErrorTest = sum(classm_test_scores*wfisher >= tfisher);

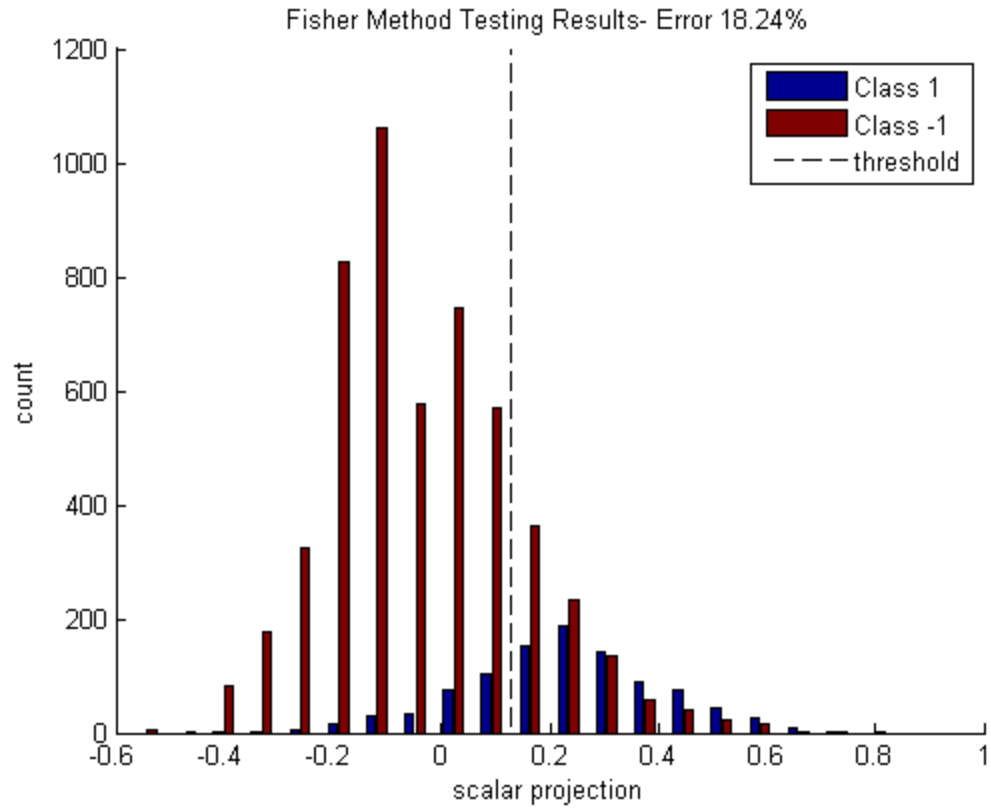
FisherTestError= ((FisherPosErrorTest + FisherNegErrorTest)/(size(trimmed_scores_t

% Histogram of Fisher Testing Results
HistClass(classp_test_scores,classm_test_scores,wfisher,tfisher,...
    'Fisher Method Testing Results',FisherTestError);

%RESULTS 11.8% training, 18.24% testing
```

```
FisherTestError =

0.1824
```



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