PCA Lab Report

Group24

- Process of the Lab work

  After loading the data files, we use vertcat() function to merge both data.

```
% Load mat file
load('HHT_data_L1R0.mat');
load('HHT_data_L1R1.mat');

% Merge both data L1R0 and L1R1 into one matrix
X = vertcat(HHT_data_L1R0,HHT_data_L1R1);
```

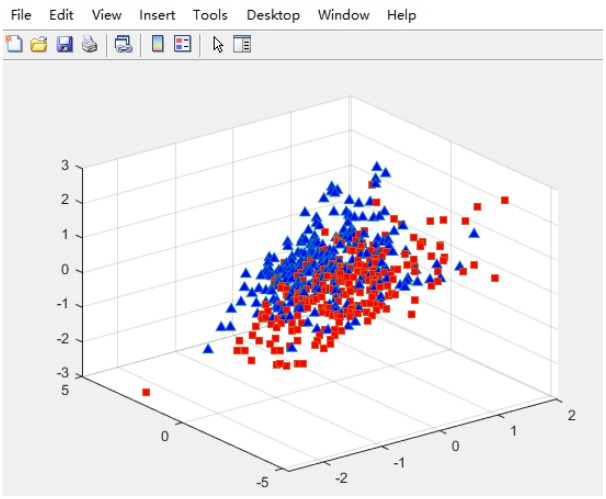
  In extraction process, we use pca() function to implement the merge file. After that, we decompose the result into different datasets and categorize them into 3 dimensions(PC1,PC2, PC3)

  In the end, we use scatter3() to show the result.

```
[coeff, score, latent] = pca(X);
PC1_L1R0 = score(1:250,1)
PC1_L1R1 = score(251:500,1)
PC2_L1R0 = score(1:250,2)
PC2_L1R1 = score(251:500,2)
PC3_L1R0 = score(1:250,3)
PC3_L1R1 = score(251:500,3)
```

```
% Visualize the result using scatter function
% Divide the result of PCA into half
% the first half is L1R0
scatter3(PC1_L1R0,PC2_L1R0,PC3_L1R0, 'Marker','^','MarkerFaceColor','blue');
hold on
% the second half is L1R1
scatter3(PC1_L1R1,PC2_L1R1,PC3_L1R1, 'Marker','s','MarkerFaceColor','red');
hold off
grid on
```

- Figure of the result of PCA of L1R1 and L1R0



- Explain what PCA does on your data
  According to our lesson, PCA transforms the raw data into lower dimensions. From the concept, fewer dimensions can help to predict the result better, which we often use dimension-reducing in feature extraction methods.
  PCA uses linear matrix to achieve the goal of dimension-reducing. After that, it analysis the “Cumulative Proportion” to ordinally consider the PCs (from the most important one to the last).
- Conclusions of result
  In the result from the figure, we can find that the features are transformed into 3D data. We can see the distribution of L1R1 & L1R0 are in categories.