FINAL REPORT

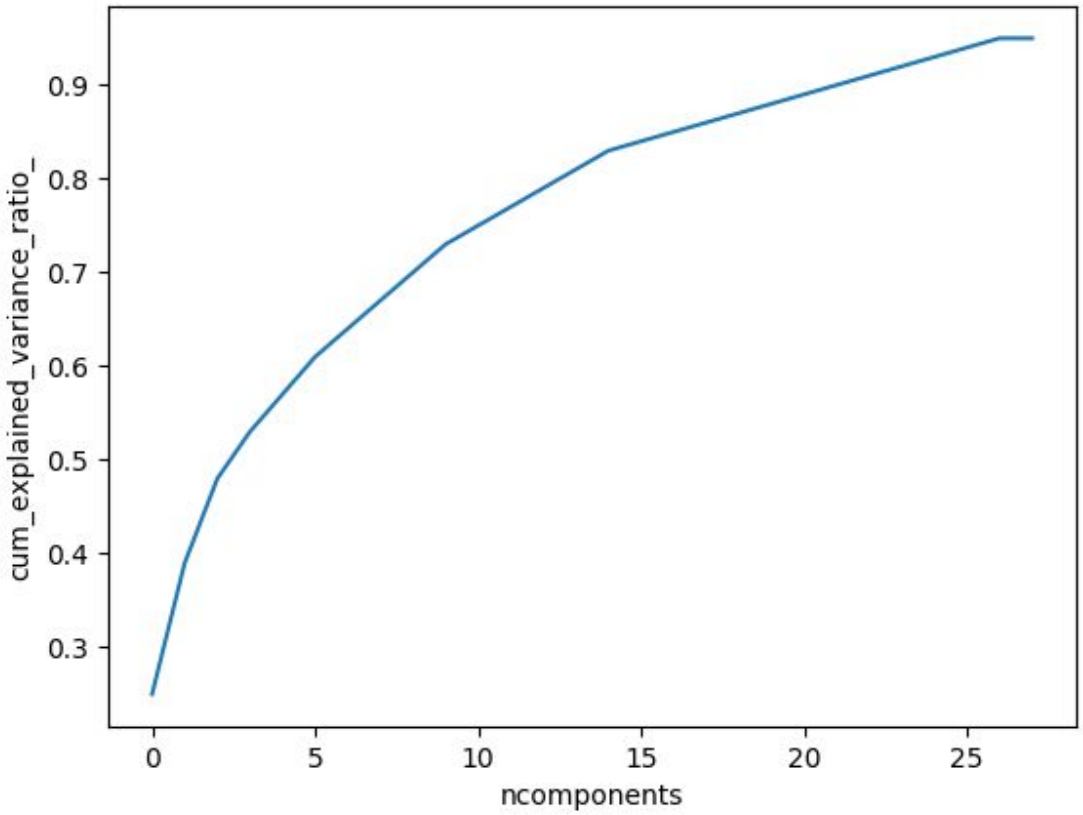
-team 39

Human Emotion Speech Classification

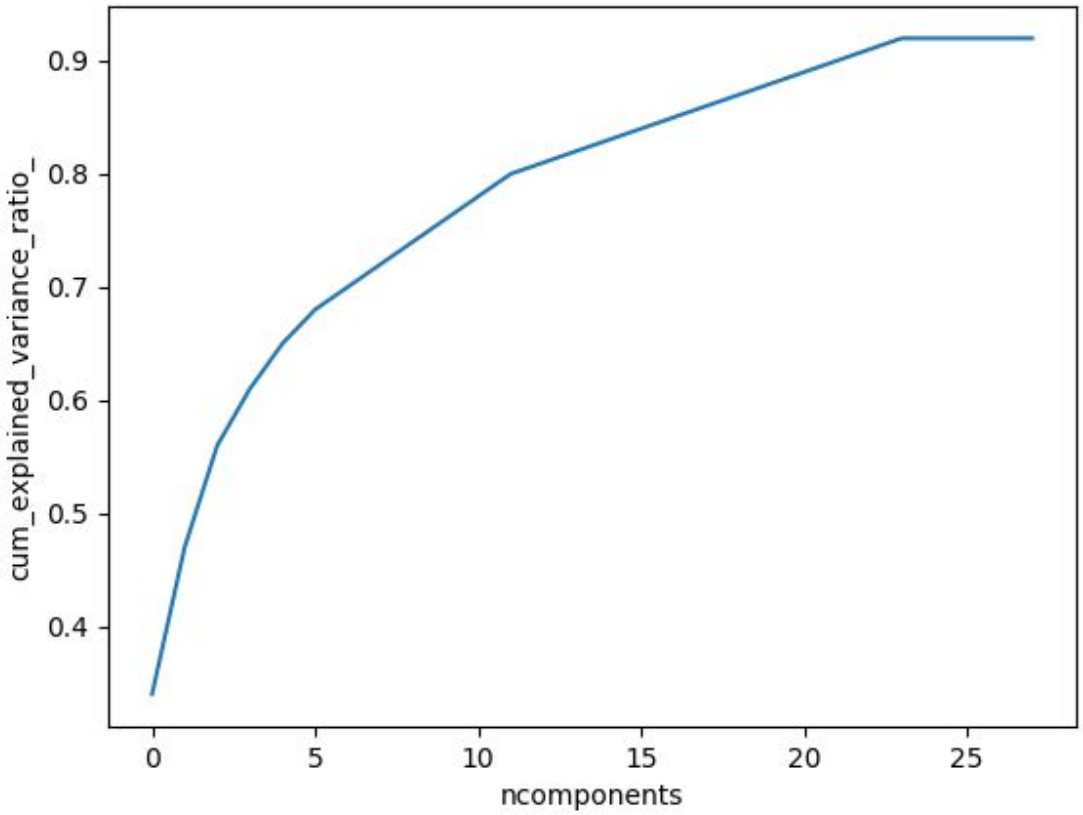
MFCC :

Mel Frequency Cepstral Co-efficents (MFCCs) are a feature widely used in automatic speech and speaker recognition.
This has been used to convert the data that is an audio file to feature vectors.

PCA



With given data:
Graph between cumulative_explained_variance_ratio_ and n_components.
28 features obtained from PCA which explained 95% of the variance.



After adding data:Graph between cumulative_explained_variance_ratio_ and n_components. 28 features obtained from PCA which explained 95% of the variance.

RANDOM FORESTS RESULTS

Taking features from PCA
Max_depth varying from 5 to 45.

Split using Gini Index .

Before Adding our own data:

no_of_features	no_of_trees	Max_depth(for which accmax)	Mean_accuracy
.5*total_features	5	25	51.136
√total_features	10	40	52.72

After adding our own data:

.3*total_features	10	20	50.32
.5*total_features	5	15	52.631
.7*total_features	35	20	51.151
√total_features	15	25	52.796

NuSVM:

NuSVM was used to train our data and we found max accuracy with nu set as 0.1

Before Adding our Data:

Average Accuracy : 0.512753623188 using classifier rbf

0.527246376812 using classifier poly

Maximum Accuracy : 0.5272 at our penalty parameter for the error term as 0.0001 to 1000 using polynomial classifier

After Adding our Data:

Average Accuracy: 0.489583333333 using classifier rbf
0.507291666667 using classifier poly

Maximum Accuracy : 0.507291666667 is seen constant by using classifier a polynomial classifier and error term lying anywhere between 0.0001 to 1000

Linear SVC:

Before Adding our Data:
Using a fixed error term as 0.1 with shuffled splits implemented to randomize our testing and training data we get an average of 0.676923 and a maximum of 0.698717 of accuracy on our test data.

After Adding our Data:

Similar to the above observations we see that our average drops down by 1%, around 0.6635 and a maximum of 0.674285 is observed.

SVM:

Grouping according arousal
Added data
classifier rbf (value of C= 0.1)
train= 0.664609375 test= 0.672790697674
classifier poly (value of C= 1)
train= 0.835546875 test= 0.671627906977

Given Data
classifier rbf (value of C= 0.1)
 train= 0.664609375 test= 0.672790697674
classifier poly (value of C= 1)
 train= 0.801057692308 test= 0.654

Grouping according valence
Added data
classifier poly (value of C= 1)
train= 0.7565625 test= 0.623488372093
classifier rbf (value of C= 1)
train= 0.7684375 test= 0.635348837209

Given data
classifier poly (value of C= 0.1)
train= 0.614711538462 test= 0.602285714286
classifier rbf (value of C= 1)
train= 0.840192307692 test= 0.655714285714

7 class with different arousal and valence
Added data
classifier rbf (value of C= 1)
train= 0.65625 test= 0.411162790698
classifier poly (value of C= 1)
train= 0.657265625 test= 0.401395348837

Given data
classifier poly (value of C= 10)
train= 0.992307692308 test= 0.434
classifier rbf (value of C= 1)
train= 0.710288461538 test= 0.423142857143

14 class
Added data
classifier poly (value of C= 10)
train= 0.983515625 test= 0.129069767442
classifier rbf (value of C= 1)
train= 0.81484375 test= 0.176046511628

Given data
classifier rbf (value of C= 1)
train= 0.829711538462 test= 0.188571428571
classifier poly (value of C= 10)
train= 0.995384615385 test= 0.174857142857

GMM:

GMM was implemented was using sklearn.

Gmm - sklearn

Before Adding our data:

diag : 0.280575539568 :train
diag : 0.313868613139 :test
tied : 0.287769784173 :train
tied : 0.299270072993 :test
full : 0.323741007194 :train
full : 0.335766423358 :test
spherical : 0.258992805755 :train
spherical : 0.248175182482 :test

After Added our data:

diag : 0.150259067358 :train
diag : 0.214659685864 :test
tied : 0.284974093264 :train
tied : 0.198952879581 :test
full : 0.39896373057 :train
full : 0.376963350785 :test

spherical : 0.316062176166 :train
spherical : 0.287958115183 :test

Supervised GMM :

It was implemented from scratch and initialised mean and covariances according to classes

Before Adding our Data:
49 % test accuracy was observed

After Adding our Data:
42 % test accuracy was observed

Supervised k-means:

	Before adding Data	**After adding Data**	**After adding Data**
14 clusters error	- 0.842857142	0.867435897436	
3 clusters_1 acc	- 0.395714285714	0.358717948718	
3 clusters_2 acc	- 0.478571428571	0.502564102564	
3 clusters_3 acc	- 0.521428571429	0.530769230769	
3 clusters_4 acc	- 0.428571428571	0.379487179487	
3 clusters_5 acc	- 0.45641025641	0.54358974359	