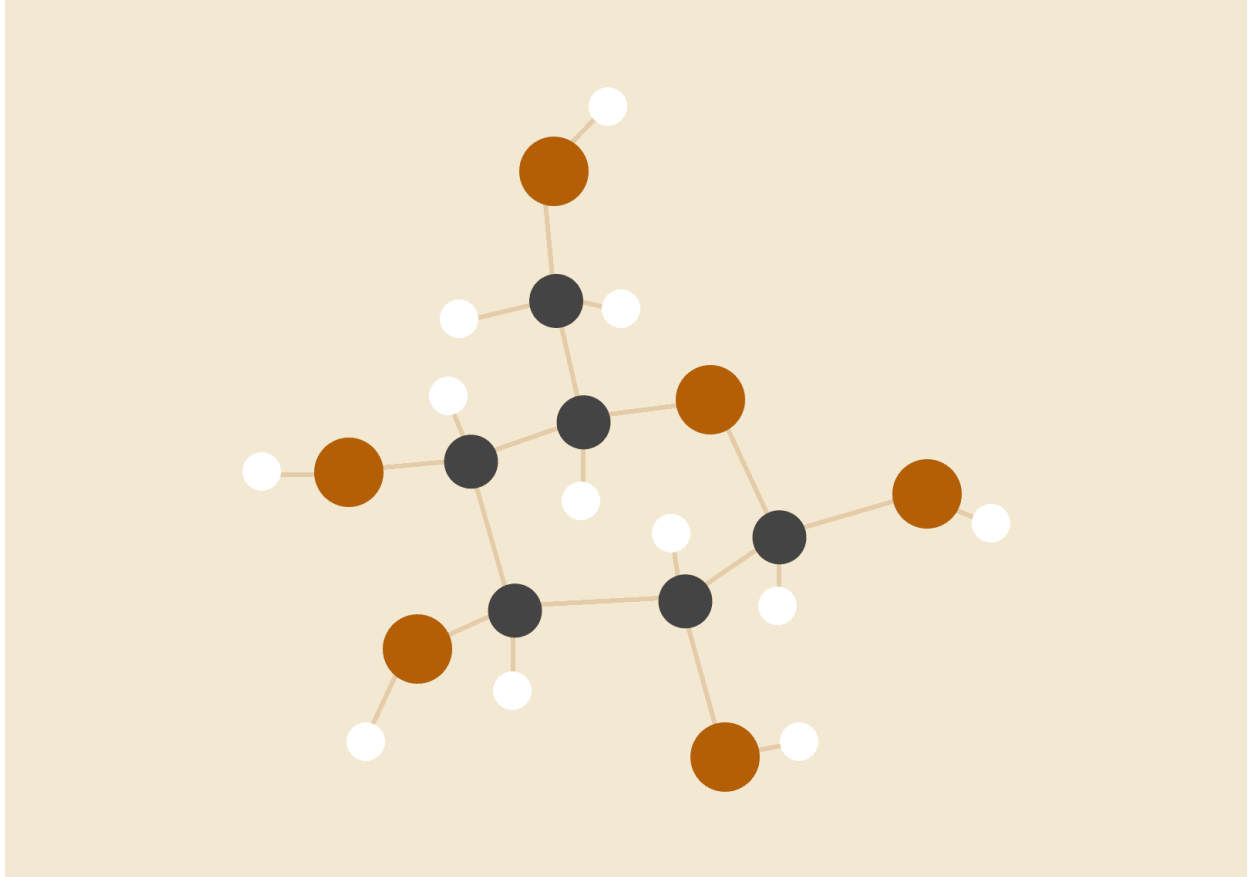


Face Recognition

Using PCA and LDA for identifying a person from an image



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Description:

Face recognition means that for a given image you can tell the subject id. Our database is very simple. It has 10 photos for each person of 40 people.

Also, we detect if an image is a human face or it is a non-face image.

Dataset:

The dataset consists of 2 parts:

- Images of people with their IDs
- Images of non-face objects (planes, cars, cats, ...etc)

Steps:

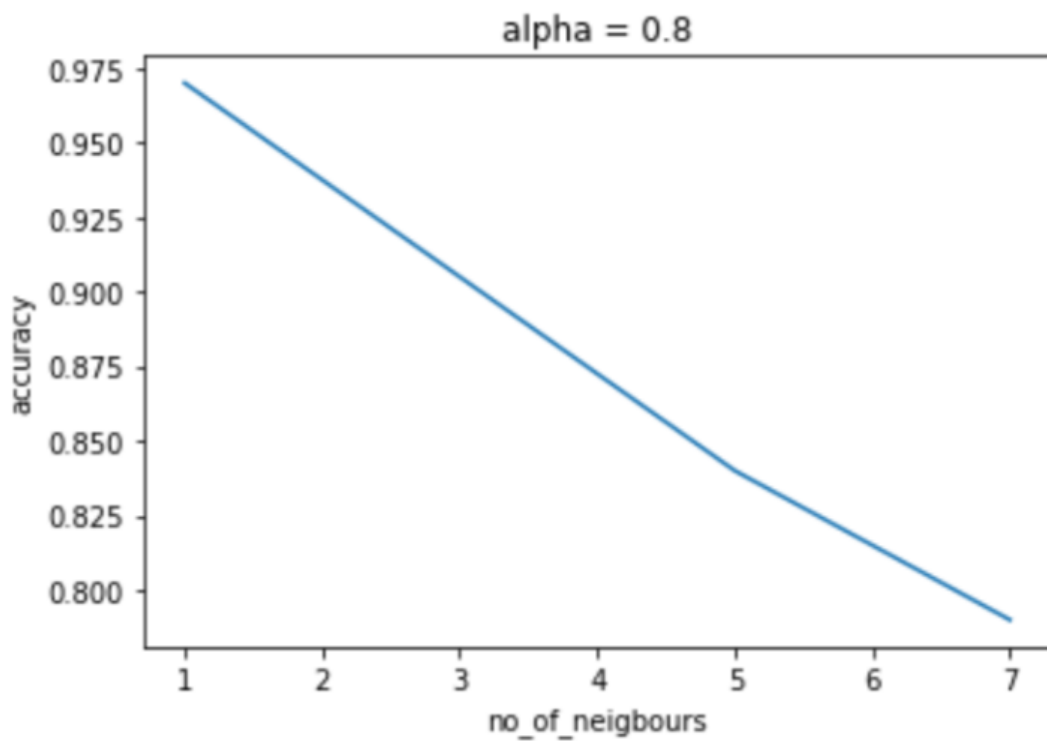
- 1) we read the first part of the dataset (human faces) and unroll it to a vector of size 400×10304
- 2) Train the model with 5 images for each person with PCA and LDA to classify each person
- 3) We read some images of the second dataset and add them to the human images.
- 4) Train the model with PCA and LDA to classify faces vs non-face images.

Classification of Human Faces

PCA:

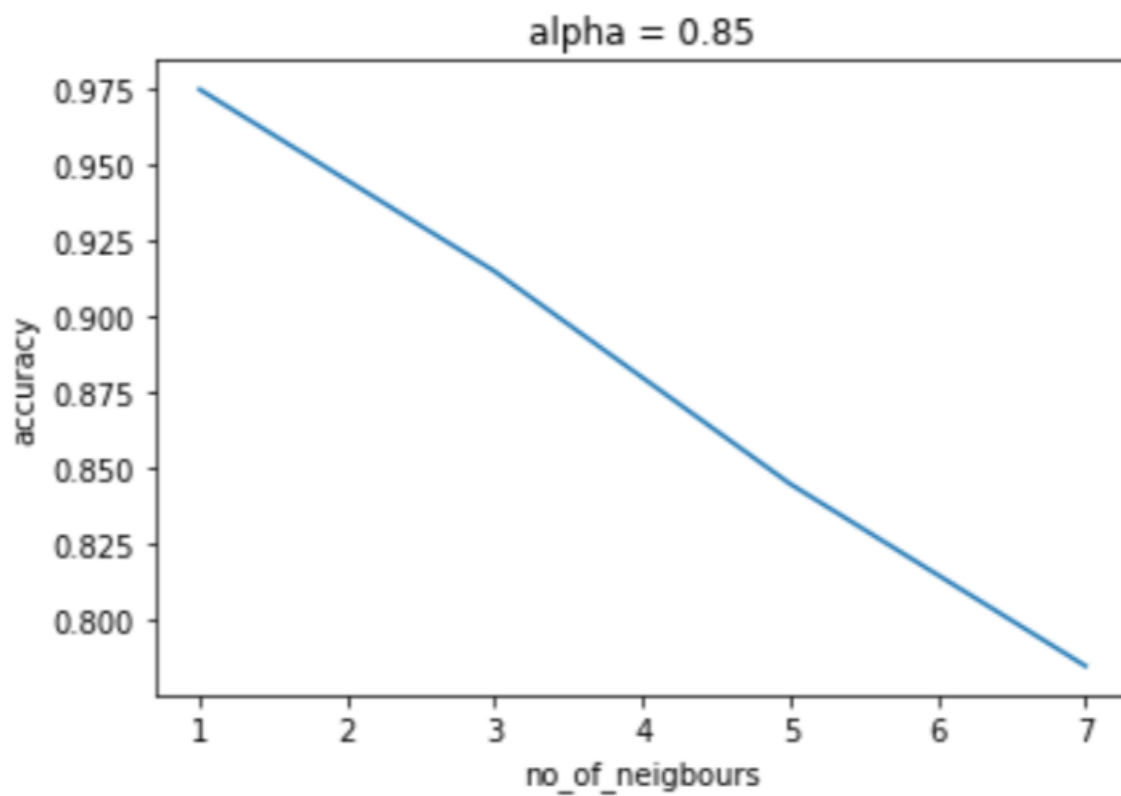
Alpha = 0.8

no_of_neighbours	Accuracy
1	0.97
3	0.905
5	0.84
7	0.79



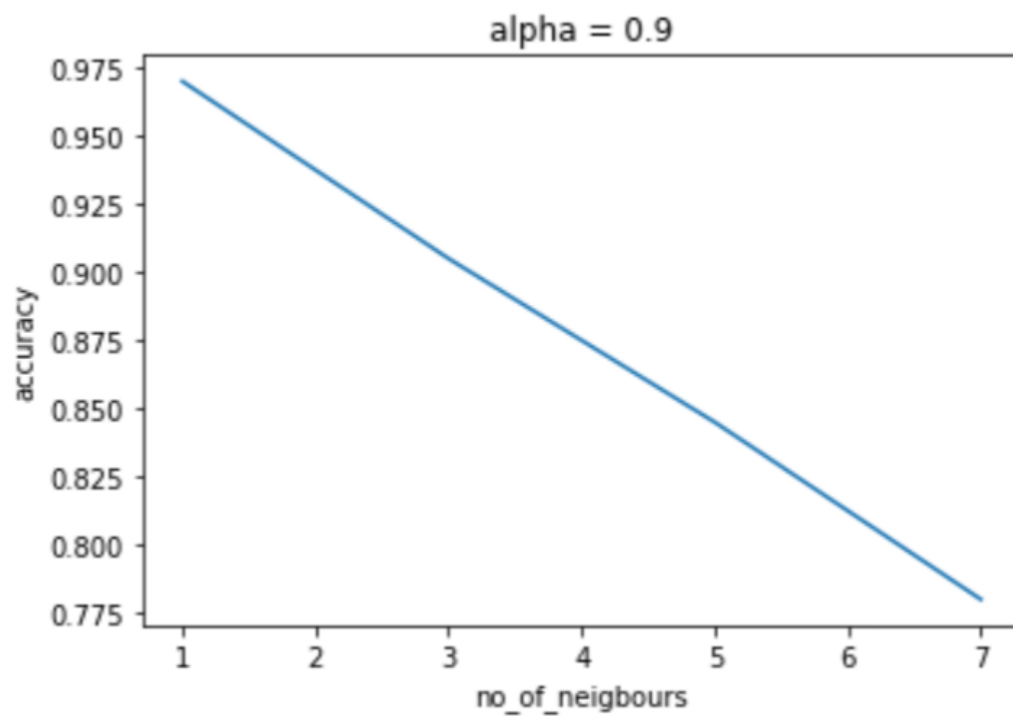
Alpha = 0.85

no_of_neighbours	Accuracy
1	0.975
3	0.915
5	0.845
7	0.785



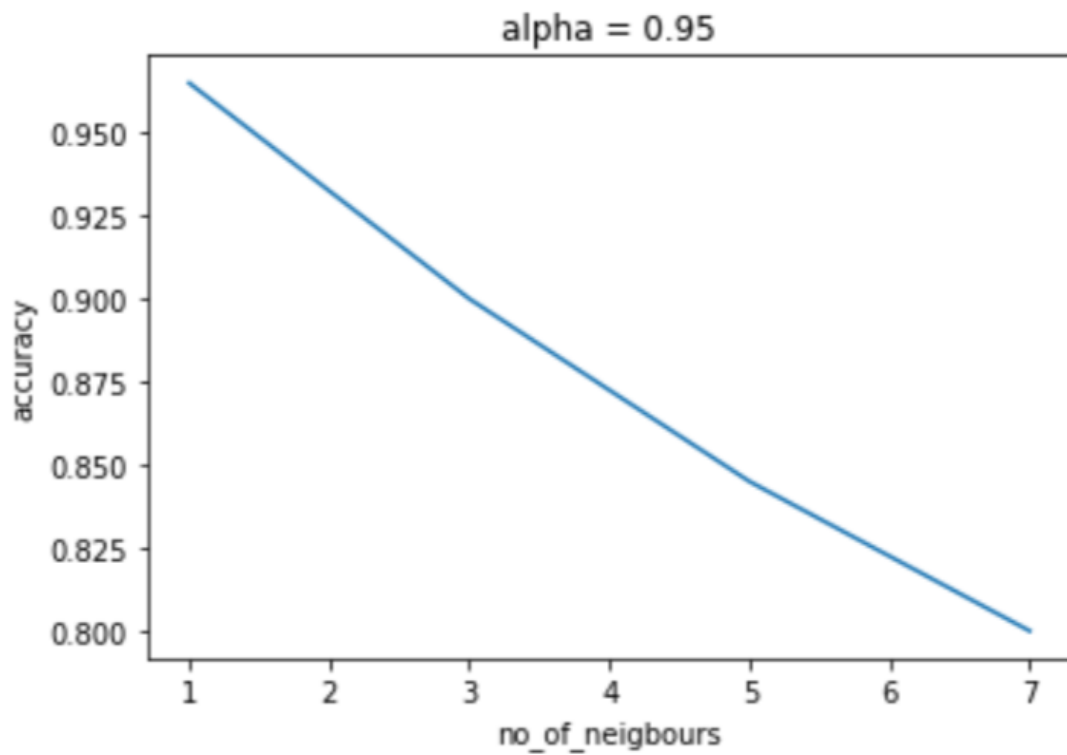
Alpha = 0.9

no_of_neighbours	Accuracy
1	0.97
3	0.905
5	0.845
7	0.78



Alpha = 0.95

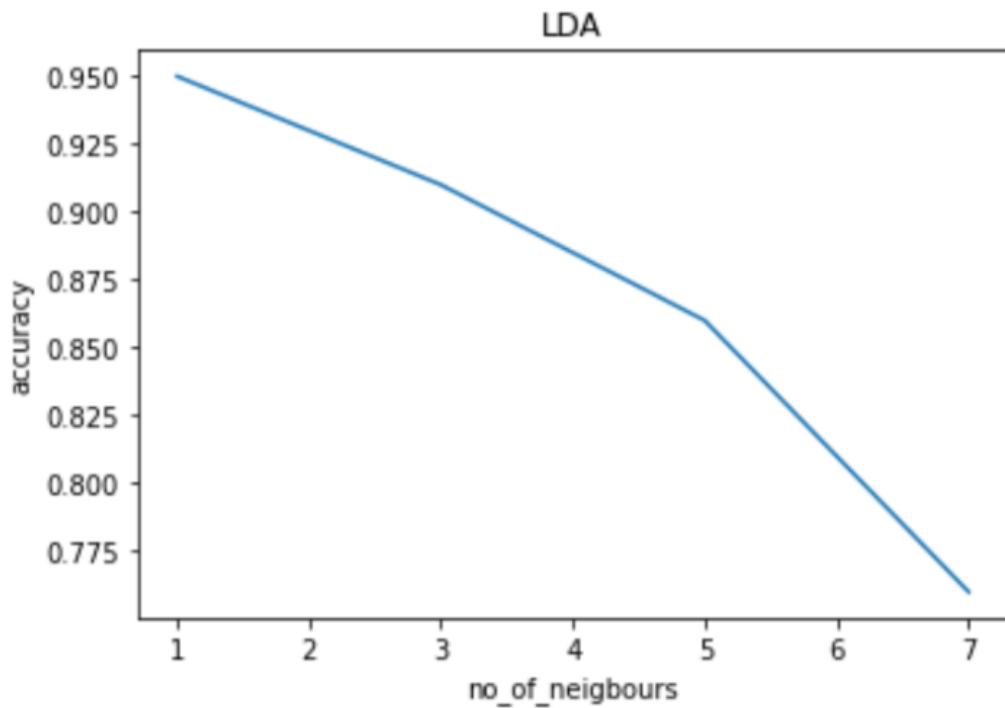
no_of_neighbours	Accuracy
1	0.965
3	0.9
5	0.845
7	0.8



From the tables above: it is clear that accuracy doesn't depend on alpha

LDA:

no_of_neighbours	Accuracy
1	0.95
3	0.91
5	0.86
7	0.76

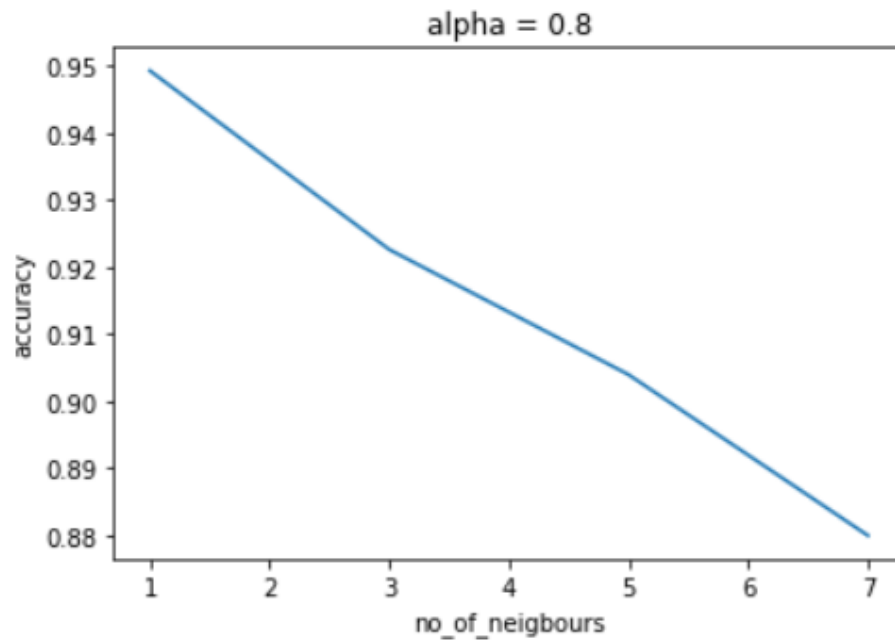


It is clear that both algorithms give nearly the same accuracy but PCA always has a little better accuracy

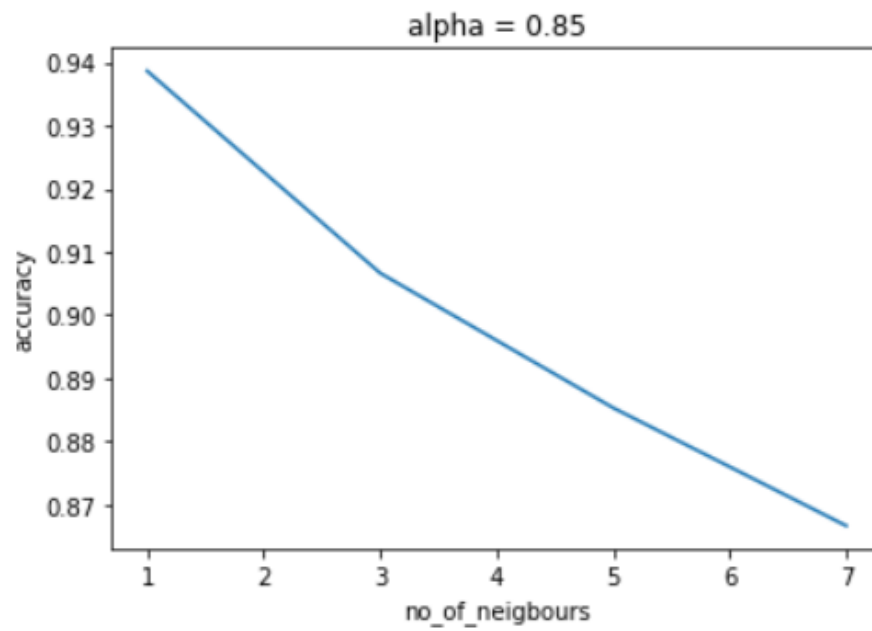
Classification of Faces VS Non-faces

PCA:

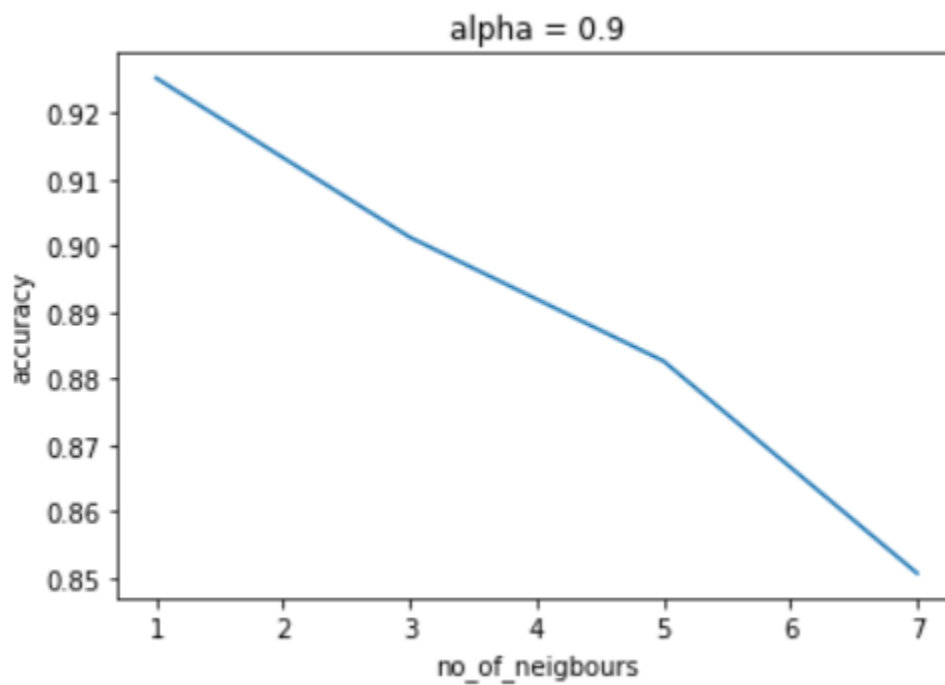
Alpha = 0.8



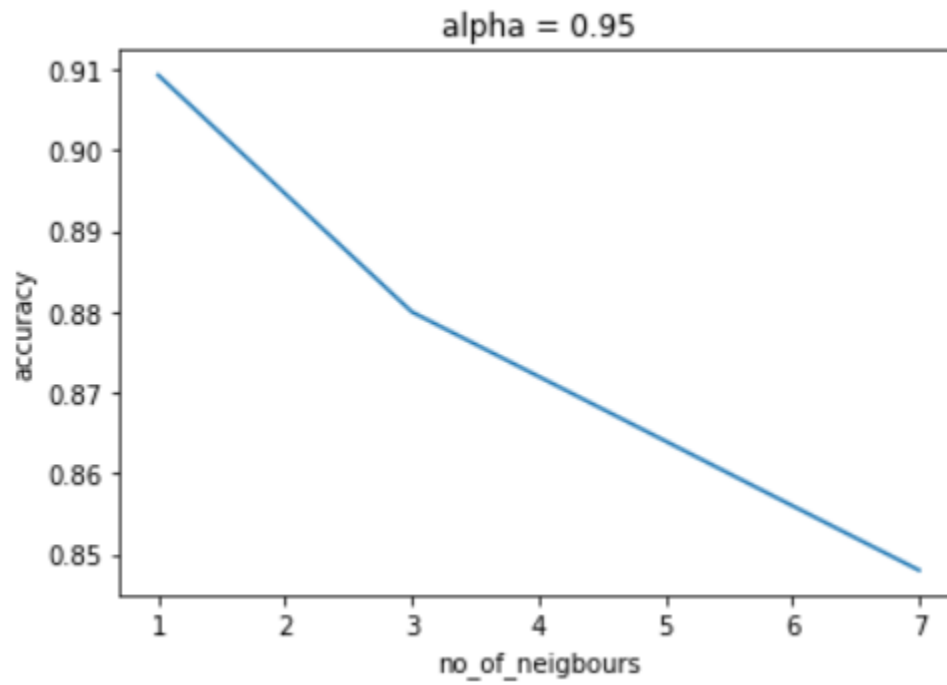
Alpha = 0.85



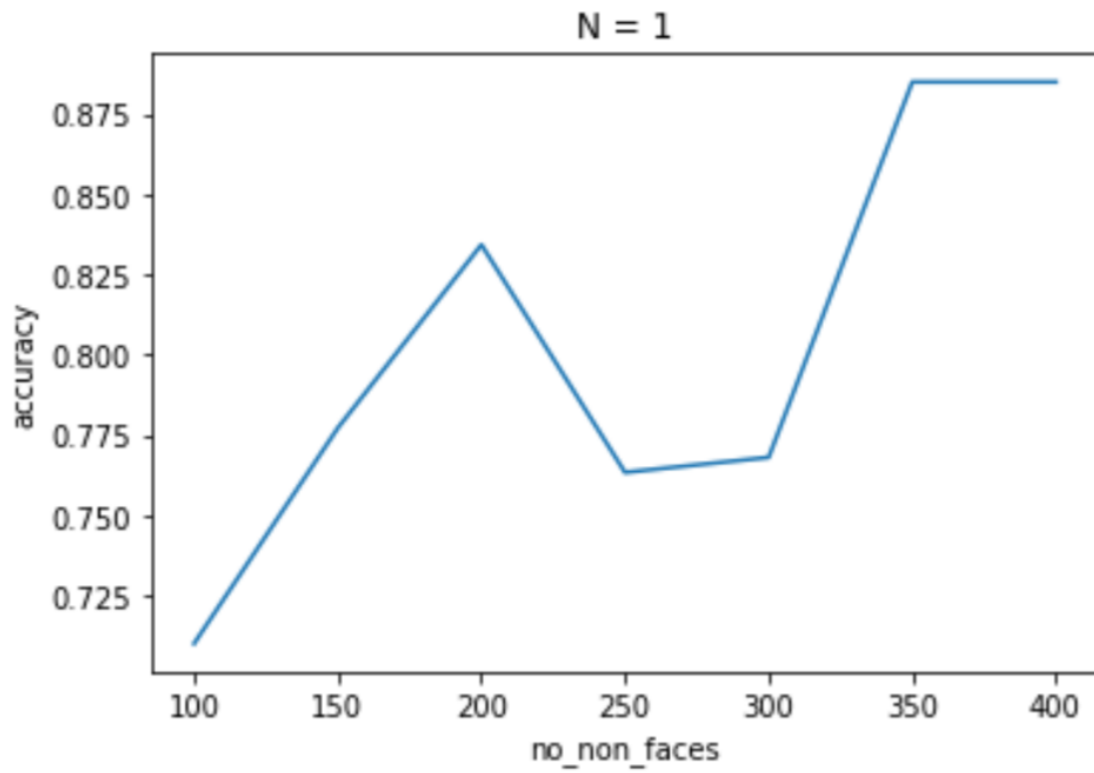
Alpha = 0.9

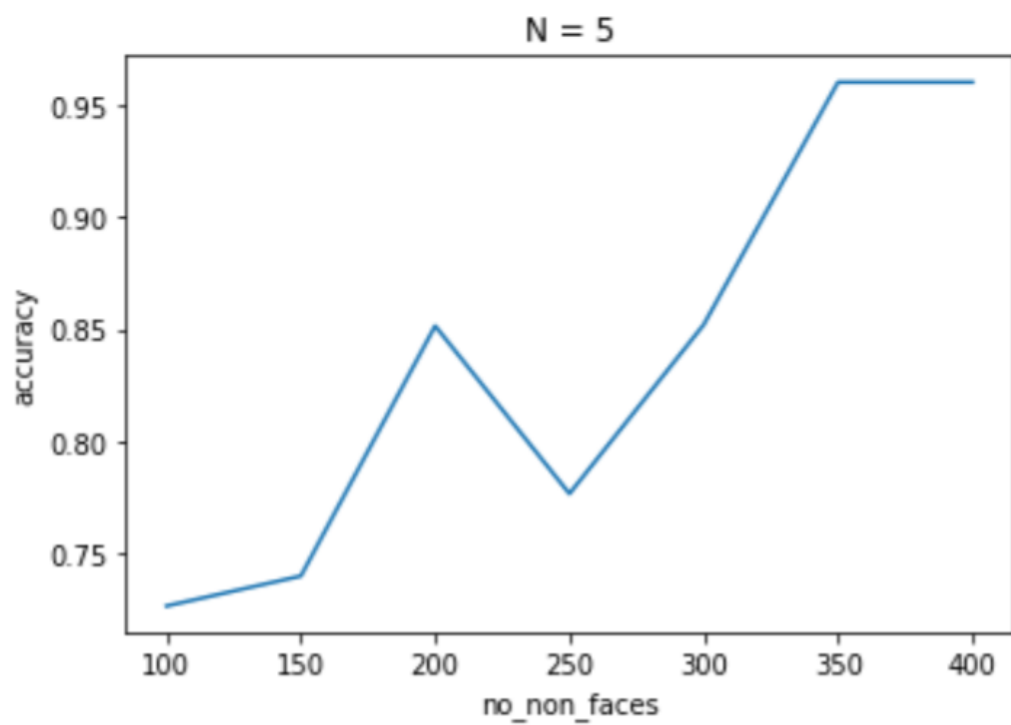
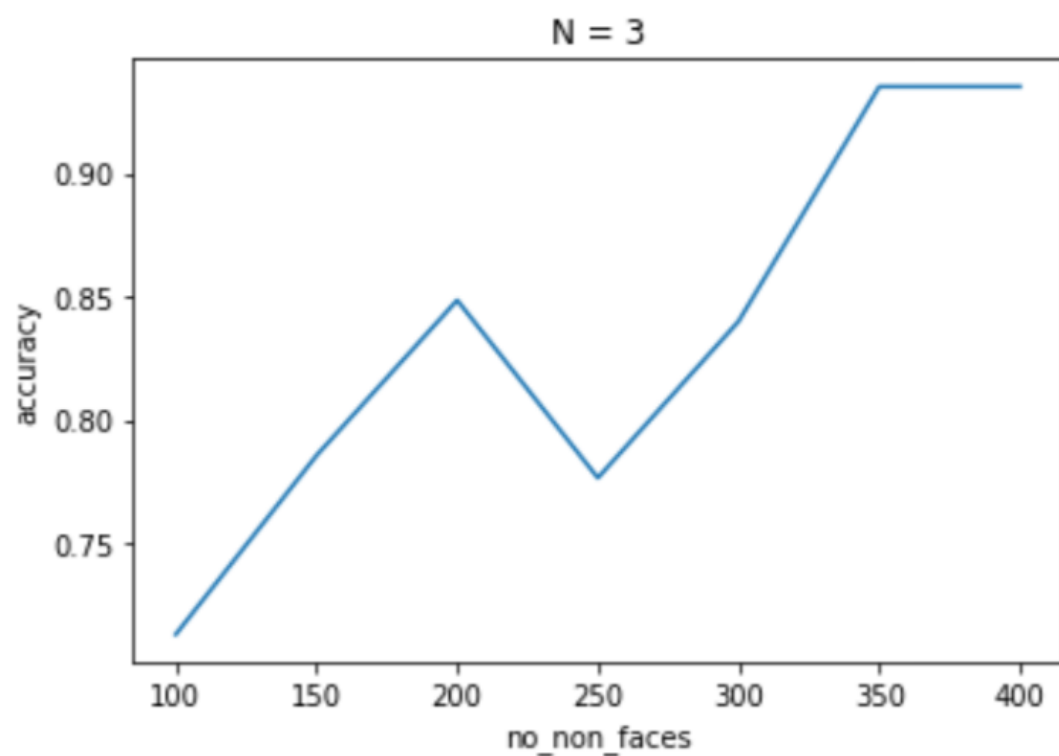


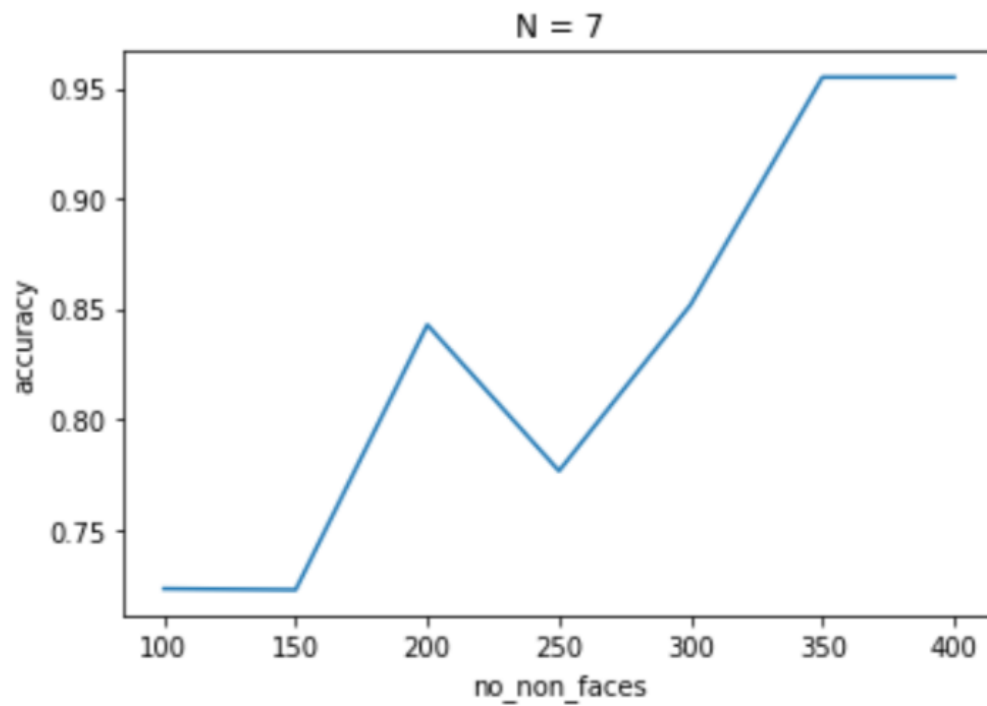
Alpha = 0.95



LDA:



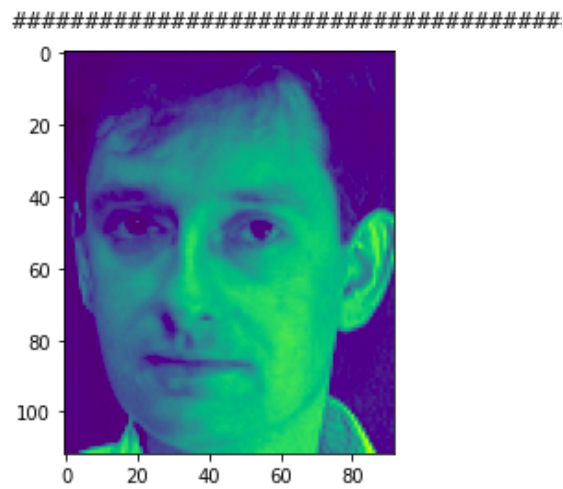
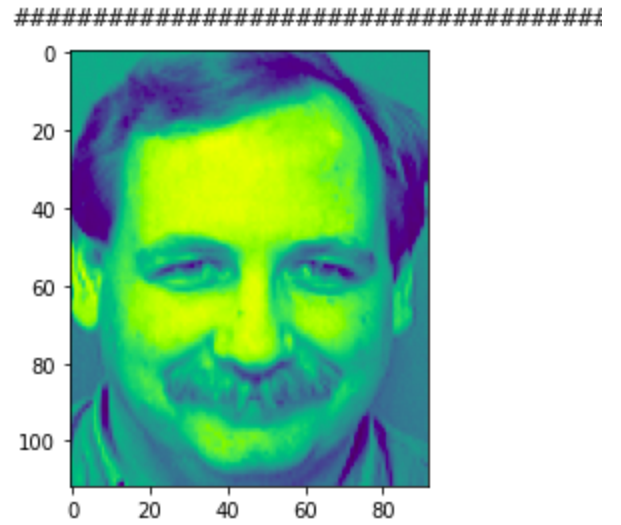
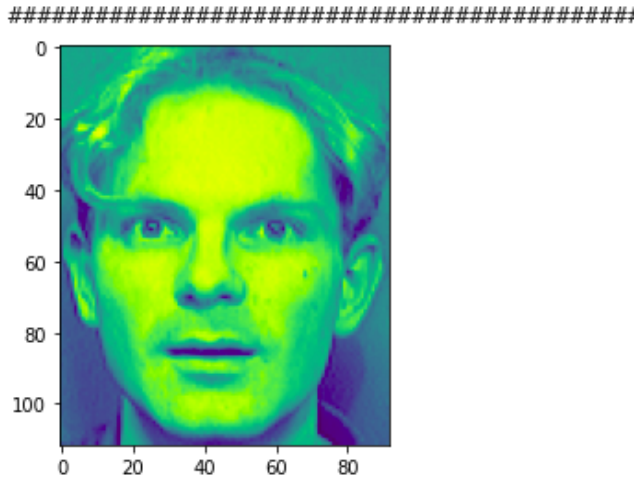




Conclusion:

Accuracy is affected greatly by the number of the training set, therefore increasing no_non_faces does a huge effect on accuracy

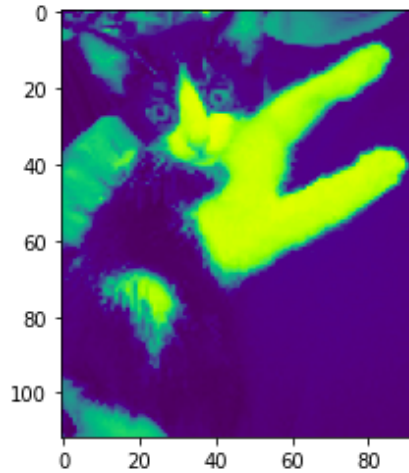
Success cases:



Failure cases:

#####

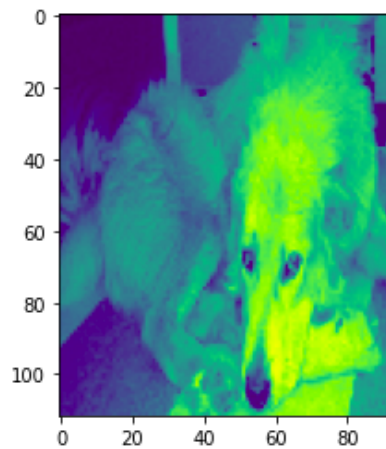
Your algorithm predicts a person picture but it's not. :D



#####

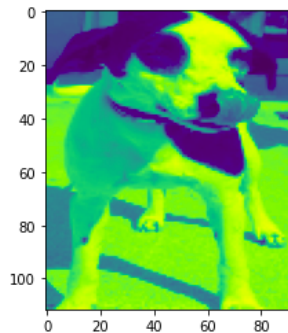
#####

Your algorithm predicts a person picture but it's not. :D



#####

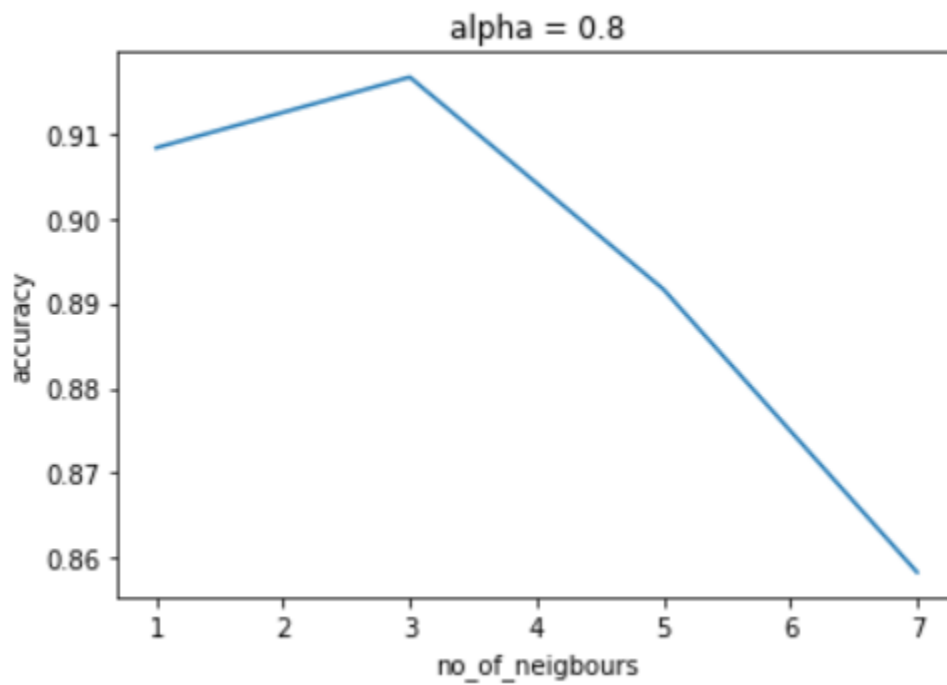
Your algorithm predicts a person picture but it's not. :D

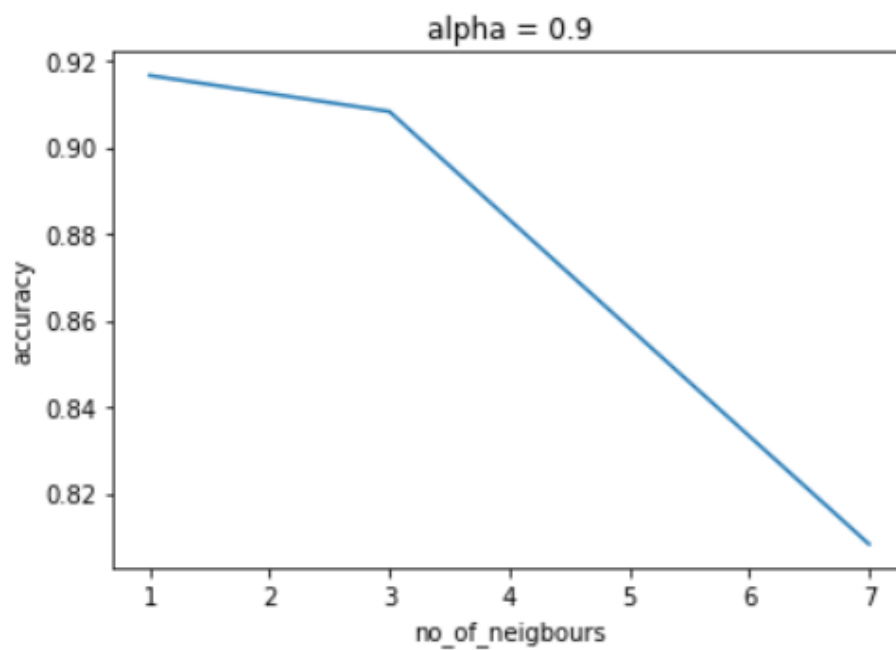
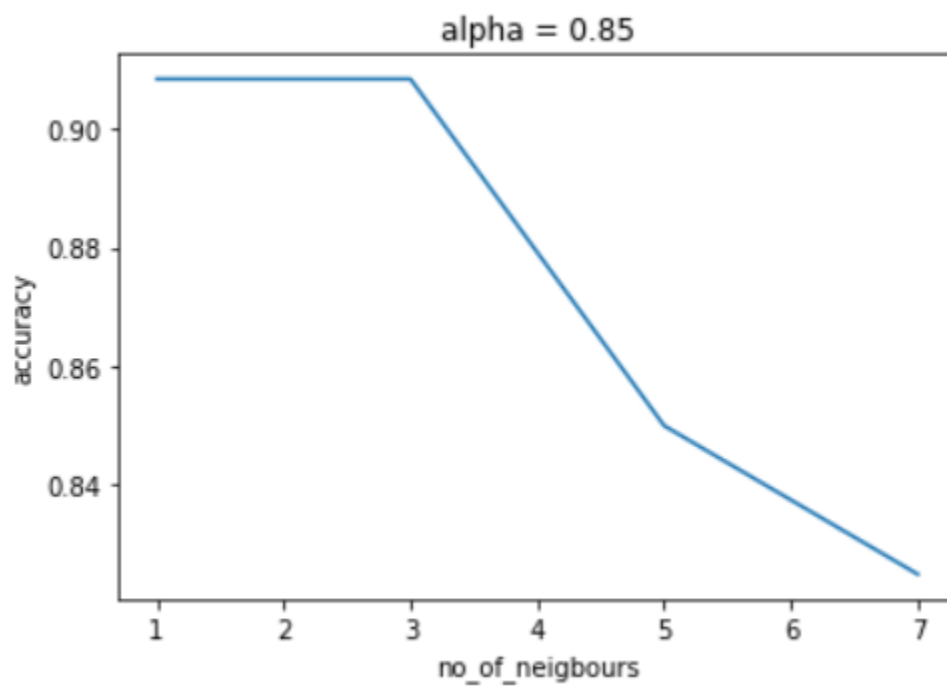


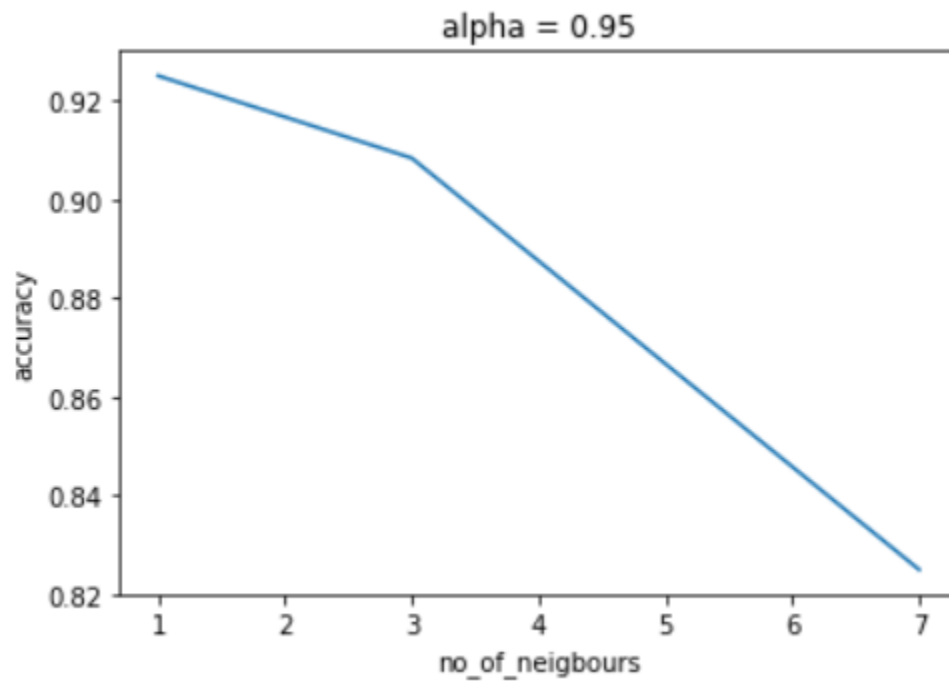
Bonus

- We split the data into 70% and 30%
- We train the model with PCA and LDA

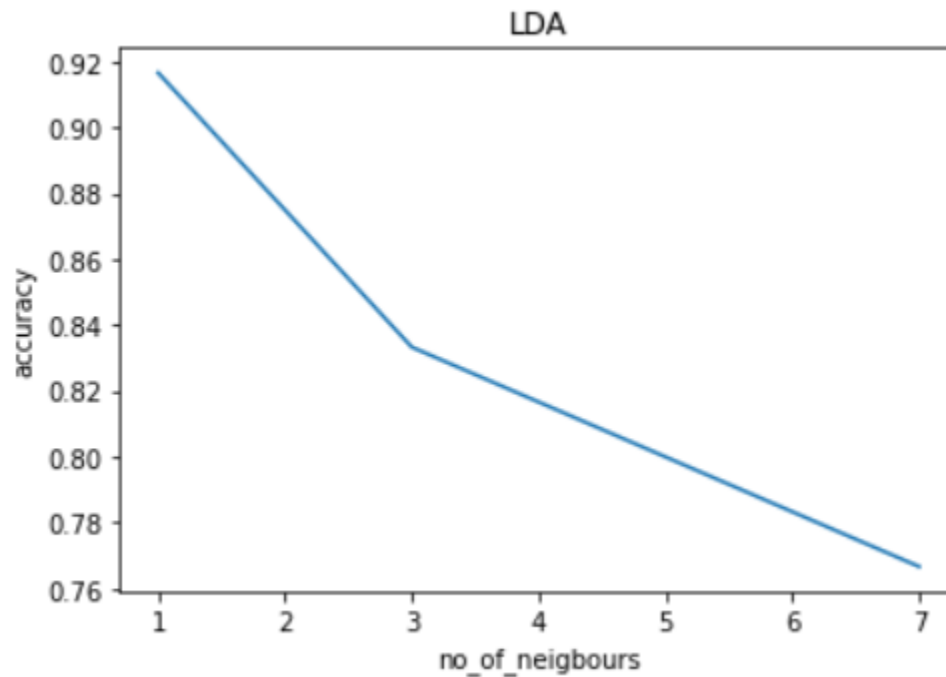
PCA:







LDA:



Conclusion:

These results are better than the previous split, due to giving the model more data to train with and also giving the LDA algorithm more points to give better dimensionality reduction vectors