NEURAL NETWORK AND ADAPTIVE SYSTEM

FINAL PROJECT PART A

BIOMETRIC FACE VERIFICATION USING AUTO ENCODER

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USING THE AT AND T DATABASE FOR FACE RECOGNITION

- Read the folders and images using cd command.

  fn = cd(['C:\Users\Ritika\Desktop\Neural Networks\Ritika_Chowdri_AE\s' num2str(i)]);

- Normalized the images between values 0 and 1.

  img = double(img)/256;

- Created a row cell vector for training and testing images (112 * 92 pixels each).

  Train_cell = mat2cell(img,112,92);

  Test_cell = mat2cell(img,112,92);

VARIATIONS IN LEARNING PARAMETERS

- For first auto encoder
  - ‘Hidden_layer1’ = 100
  - 'MaxEpochs‘ = 400
- For second auto encoder
  - ‘Hidden_layer2’ = 50
  - ‘MaxEpochs’ = 100

'L2WeightRegularization‘ = 0.006 and 0.008

'SparsityRegularization‘ = 1 and 3

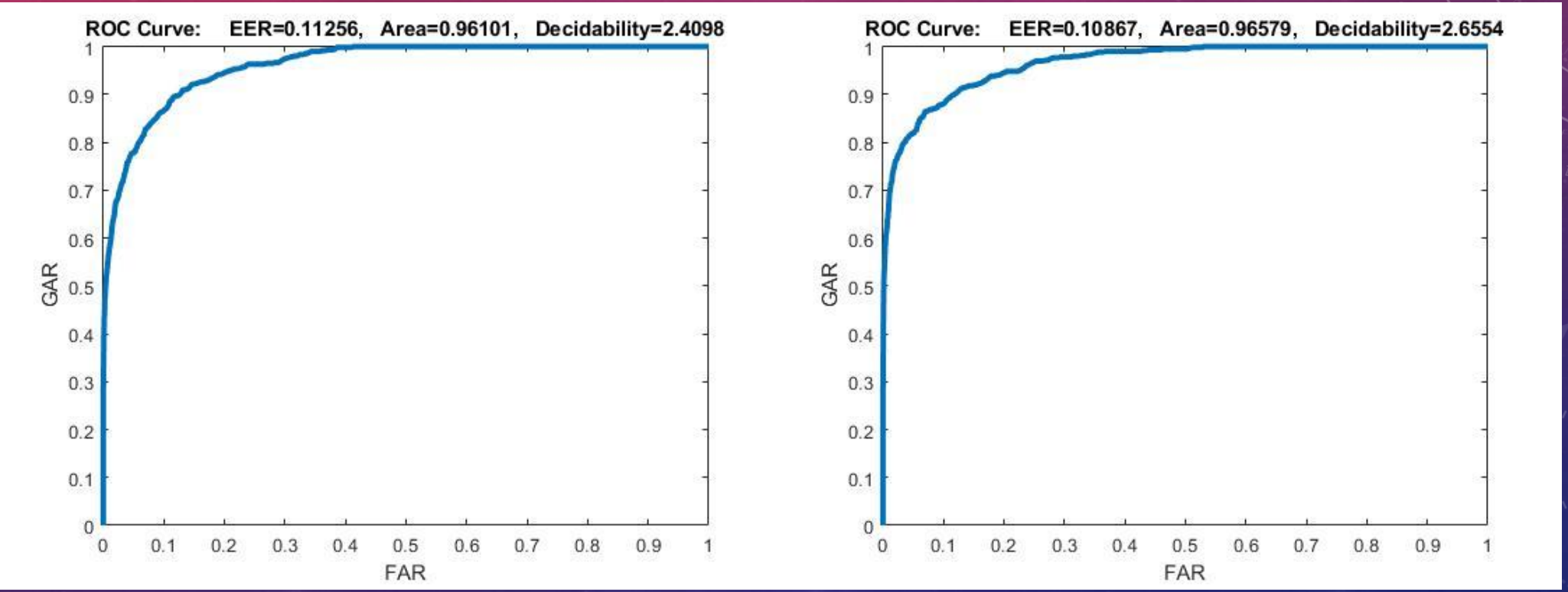
'SparsityProportion‘ = 0.15 and 0.30

Total 8 combinations of L2WR, SR and SP

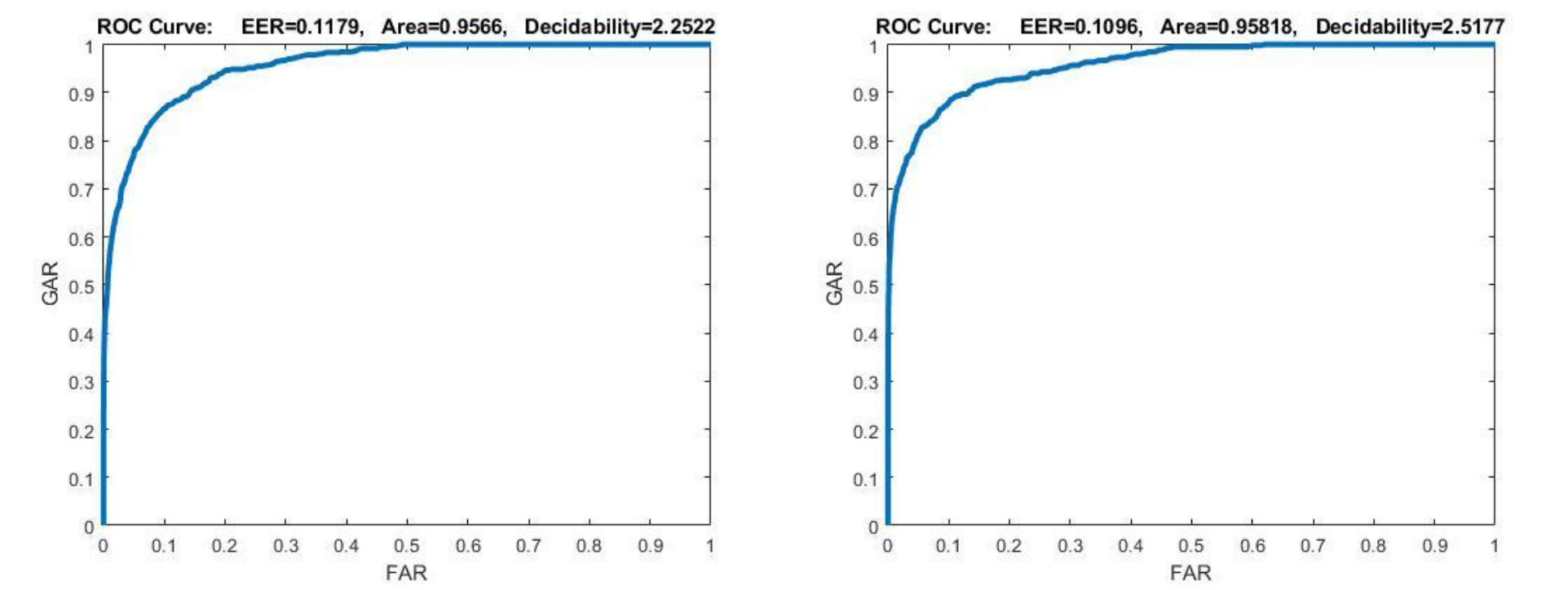
USING DIFFERENT COMBINATIONS OF THE LEARNING PARAMETERS, FIND THE BEST DEEP REPRESENTATION(S) USING STACKED AUTO-ENCODERS THAT MAXIMIZE THE INTER-CLASS TO INTRA-CLASS VARIATIONS (D') IN -MSE SENSE.

- First we train the sparse auto encoder on the training data without using the labels.
- Weights are randomly initialized before training.
- The feature vector is generated and passed to the second auto encoder.
- Train the softmax layer to classify the 50 dimensional feature vector.
- Genuine scores = 600
- Imposter scores = 28080

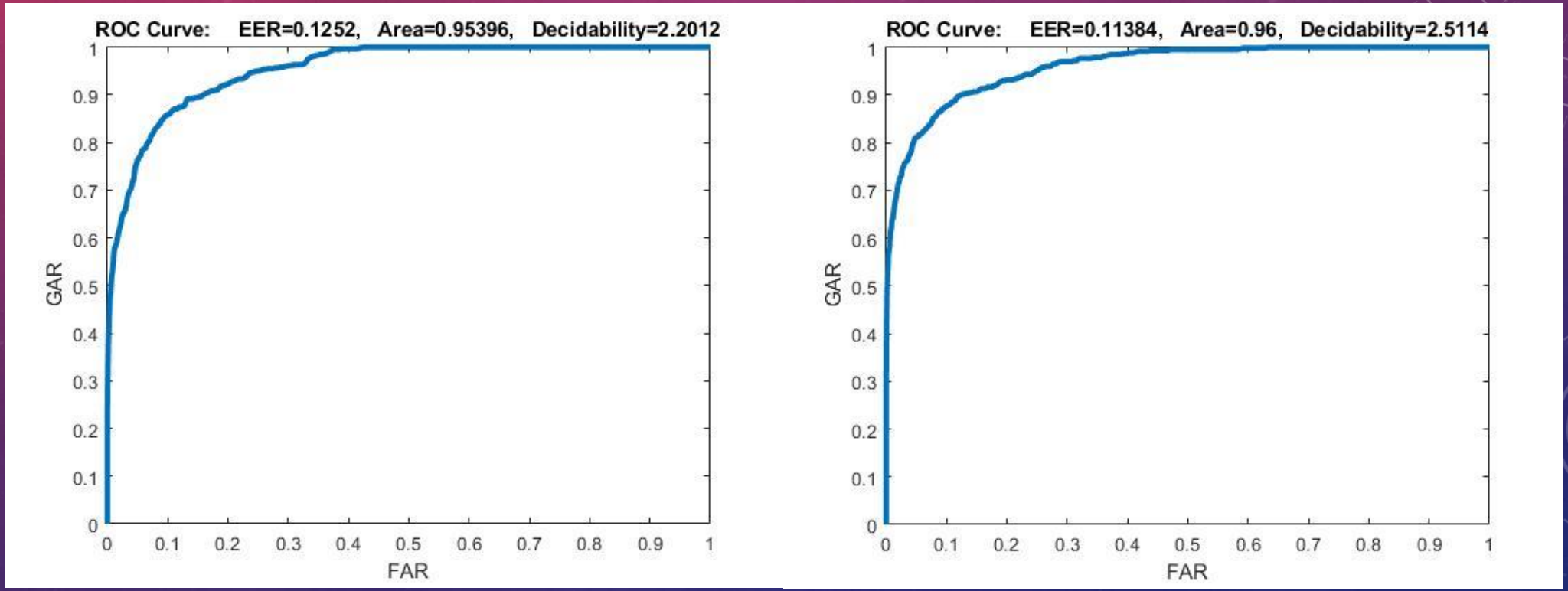
RESULTS


ROC Curve: EER=0.11256, Area=0.96101, Decidability=2.4098
GAR
FAR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
ROC Curve: EER=0.10867, Area=0.96579, Decidability=2.6554
GAR
FAR

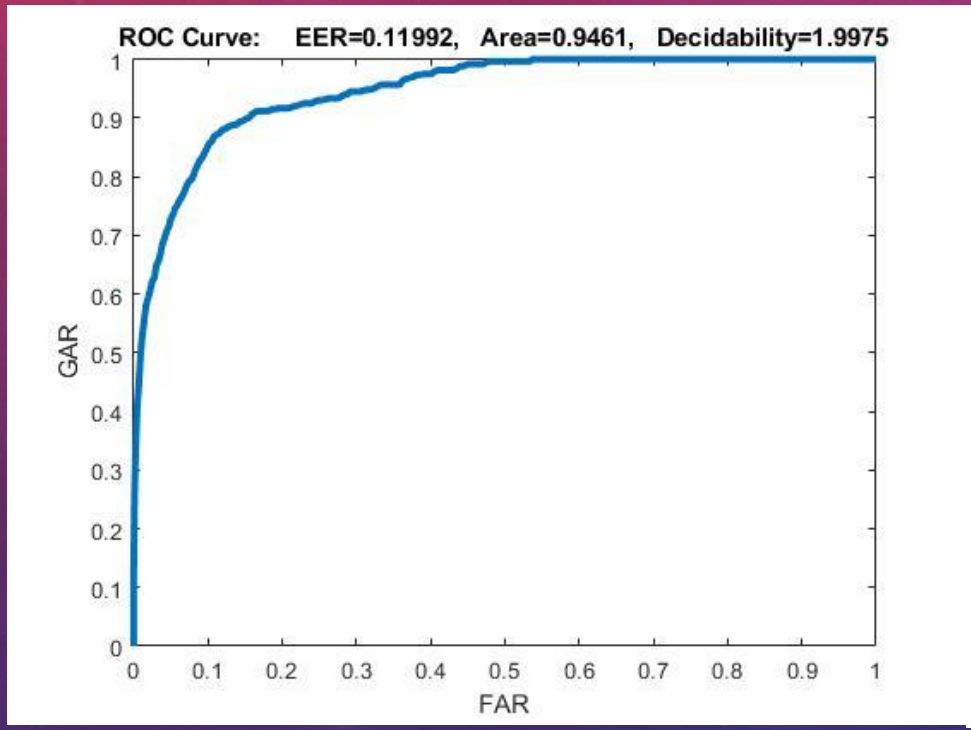
RESULTS

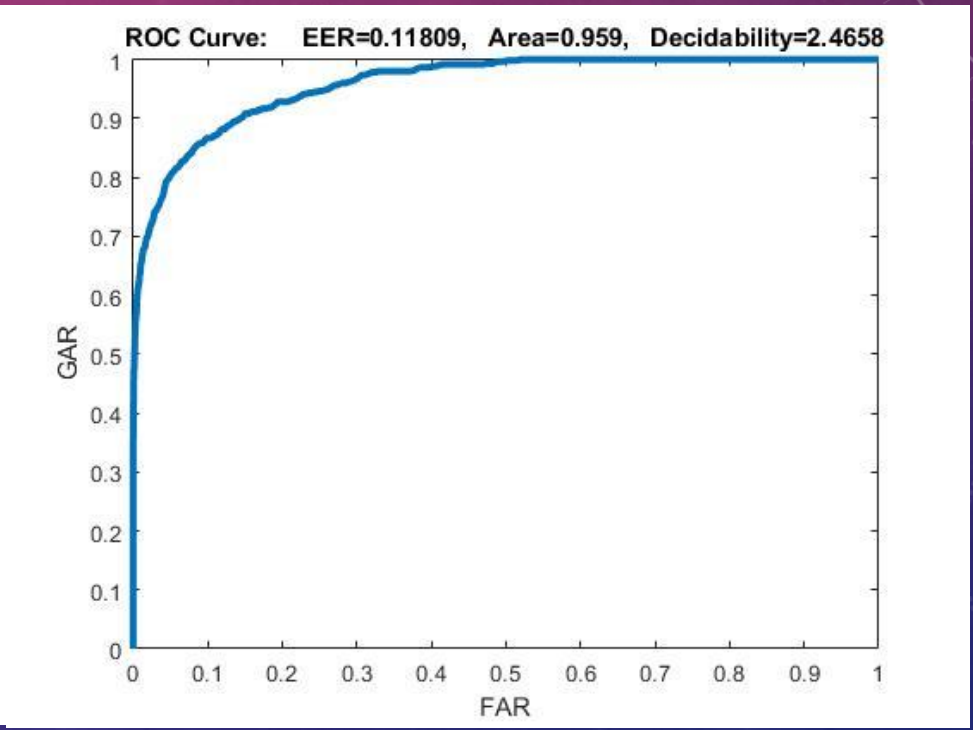

ROC Curve: EER=0.1179, Area=0.9566, Decidability=2.2522
GAR
FAR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
ROC Curve: EER=0.1096, Area=0.95818, Decidability=2.5177
GAR
FAR

RESULTS


ROC Curve: EER=0.1252, Area=0.95396, Decidability=2.2012
GAR
FAR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1
ROC Curve: EER=0.11384, Area=0.96, Decidability=2.5114
GAR
FAR

RESULTS

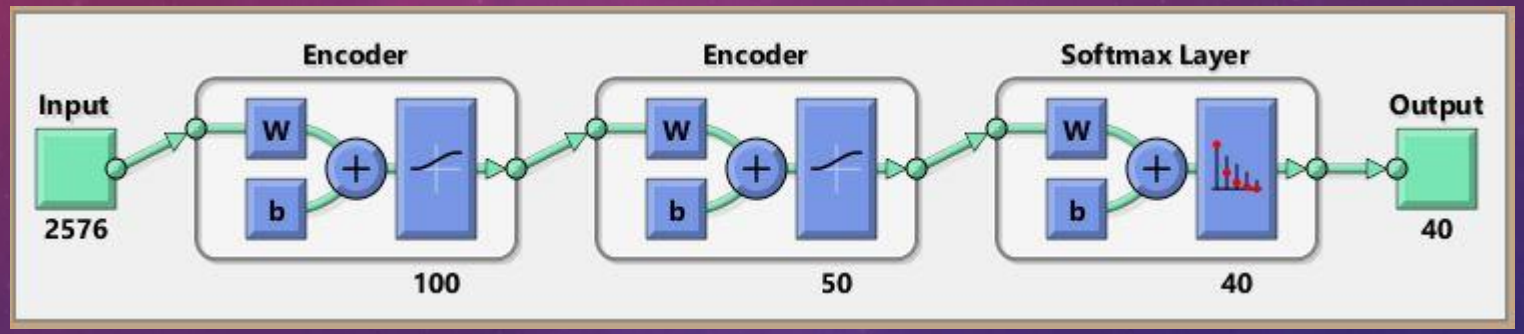

ROC Curve: EER=0.11992, Area=0.9461, Decidability=1.9975
GAR
FAR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


ROC Curve: EER=0.11809, Area=0.959, Decidability=2.4658
GAR
FAR
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

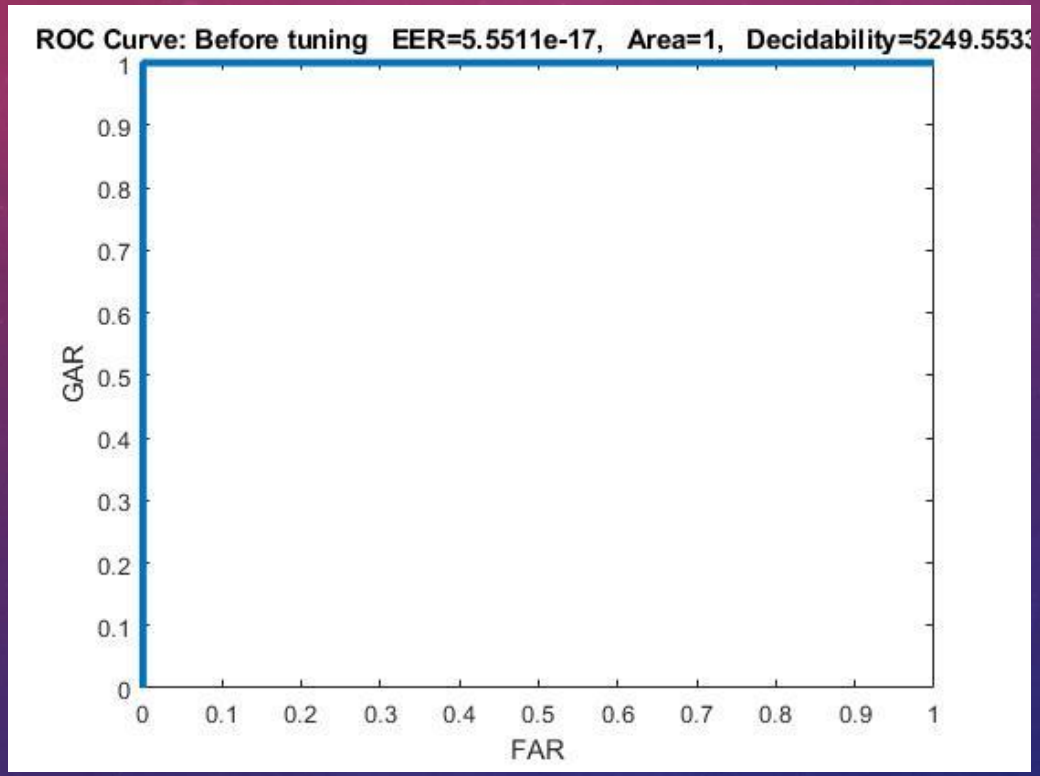
AREA UNDER THE CURVE

S. No.	L2WR	SR	SP	AUC
1.	0.006	1	0.15	0.9610
2.	0.006	1	0.30	0.9657
3.	0.006	3	0.15	0.9566
4.	0.006	3	0.30	0.9581
5.	0.008	1	0.15	0.9539
6.	0.008	1	0.30	0.96
7.	0.008	3	0.15	0.9461
8.	0.008	3	0.30	0.9597

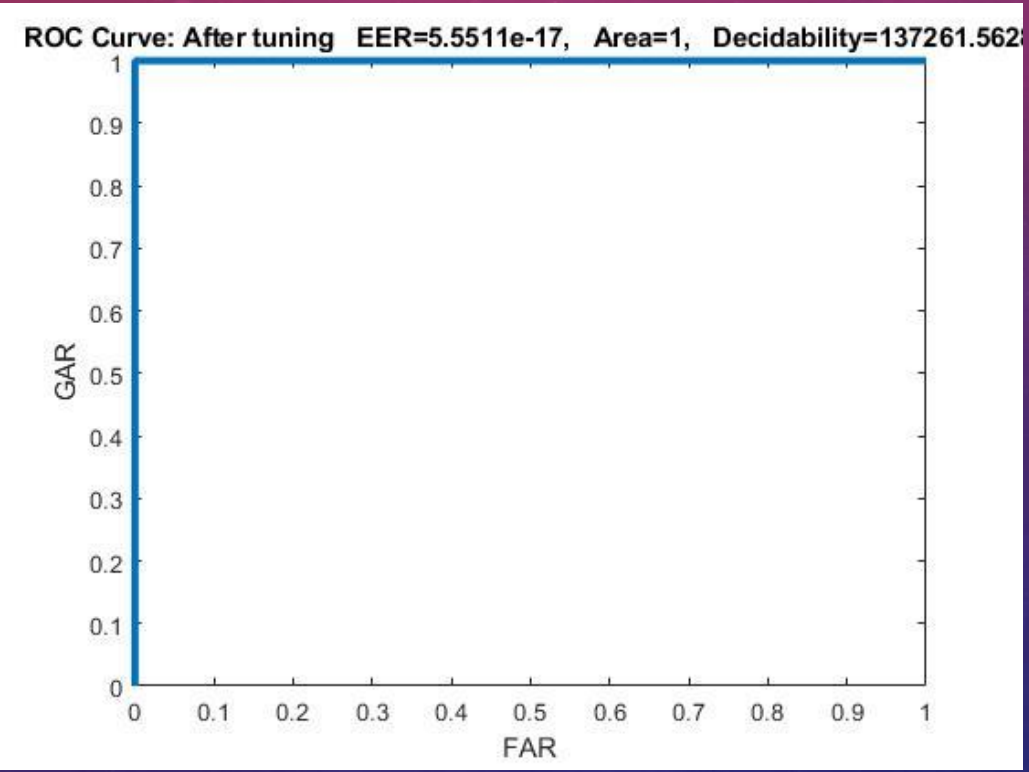
DEEPNET USING TWO AUTO ENCODER AND A SOFTMAX LAYER



TAKING THE BEST CONFIGURATION WE TRAIN THE NEURAL NETWORK AND GENERATE ROC CURVES FOR TEST IMAGES.



THE ABOVE RESULT CAN BE FURTHER IMPROVED BY TUNING THE DATA BY PERFORMING BACK PROPAGATION ON MULTILAYER NETWORK.



CONCLUSIONS

- Normalizing the data is done to improve the performance of the network.
- Larger the Sparsity Regularization, worse is the ROC curve.
- Larger the Weight Decay, lesser is the effect of Sparsity Regularization on ROC.
- Fine tuning the network improves the performance.

THANK YOU.