

Ques 1.

1.

1 as positive class

Precision 0.9077212806026366

Recall 0.964

[[964. 98.]

[36. 902.]]

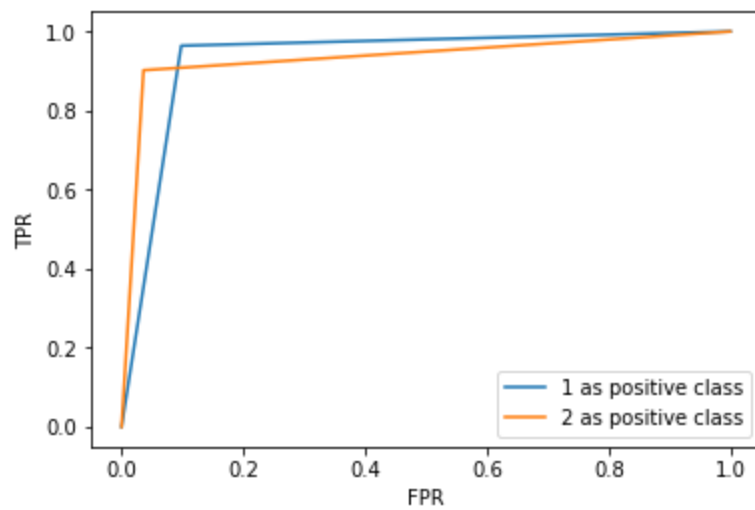
2 as positive class

Precision 0.9616204690831557

Recall 0.902

[[902. 36.]

[98. 964.]]



ROC :

2.

I.

Class : 0

Precision 0.1459599027946537

Recall 0.961

[961. 5623.]

[39. 3377.]

Class: 1

Precision 0.2752934600335383

Recall 0.985

[985. 2593.]

[15. 6407.]

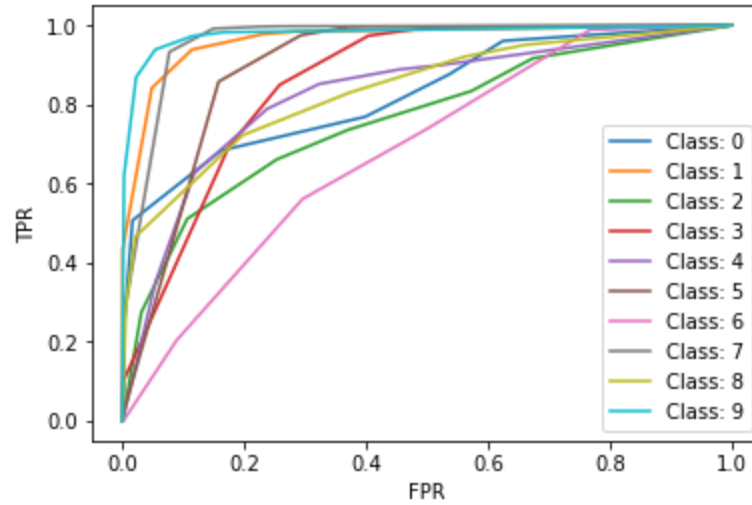
Class: 2

Precision 0.13131891737075754

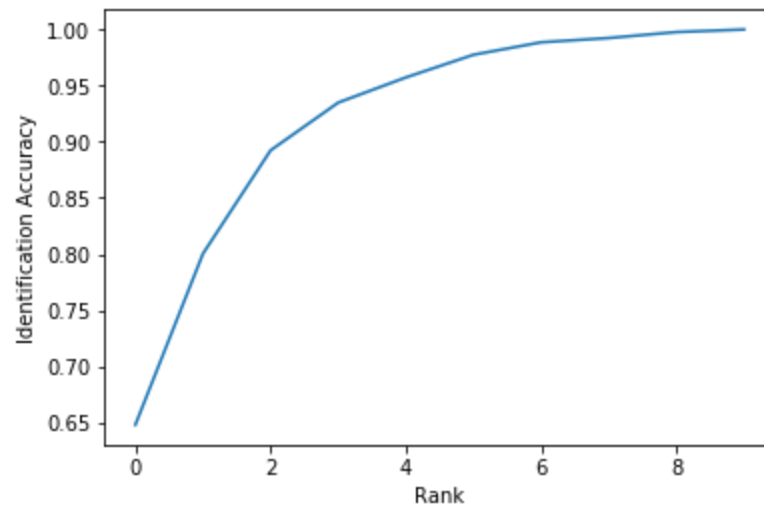
Recall 0.917

[917. 6066.]

[83. 2934.]
Class : 3
Precision 0.18035164038426682
Recall 0.995
[995. 4522.]
[5. 4478.]
Class: 4
Precision 0.16137138754263147
Recall 0.899
[899. 4672.]
[101. 4328.]
Class: 5
Precision 0.21556756756756756
Recall 0.997
[9.970e+02 3.628e+03]
[3.000e+00 5.372e+03]
Class: 6
Precision 0.10059350165979278
Recall 1.0
[1000. 8941.]
[0. 59.]
Class: 7
Precision 0.29978972664463804
Recall 0.998
[9.980e+02 2.331e+03]
[2.000e+00 6.669e+03]
Class: 8
Precision 0.13776618861364623
Recall 0.951
[951. 5952.]
[49. 3048.]
Class: 9
Precision 0.3955734406438632
Recall 0.983
[983. 1502.]
[17. 7498.]



II. ROC:



III. CMC :

Ques 2.

1.

I.

1: 6742

8: 5851

7 : 6

II.

Randomized 5-Fold:

Validation

Mean: 0.5355043685464654

Variance: 2.2055655199955195e-05

Training

Mean: 0.5353449131513648

Variance: 1.3776576421257222e-06

Stratified 5-Fold:

Validation

Mean: 0.5353797914830751

Variance: 3.9509912112516264e-05

Training

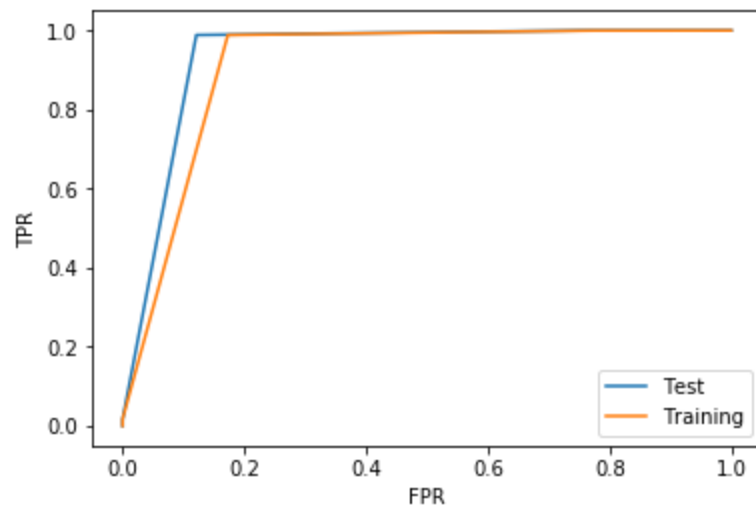
Mean: 0.5259512548917922

Variance: 3.9509912112516264e-05

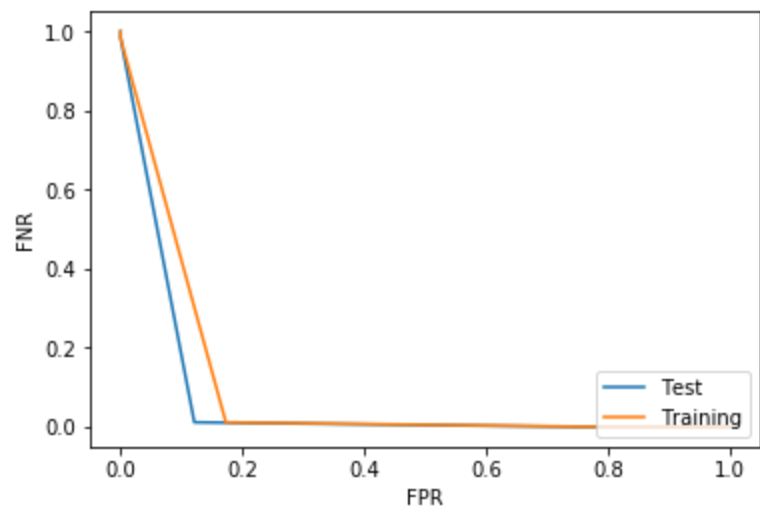
III.

A.

Randomized 5-Fold:



ROC:



DET:

Equal Error Rate(Test): Threshold(0.53)

Equal Error Rate(Training): Threshold(0.53)

B.

Confusion Matrix: Test

[[1122. 118.]

[13. 856.]]

Confusion Matrix: Training

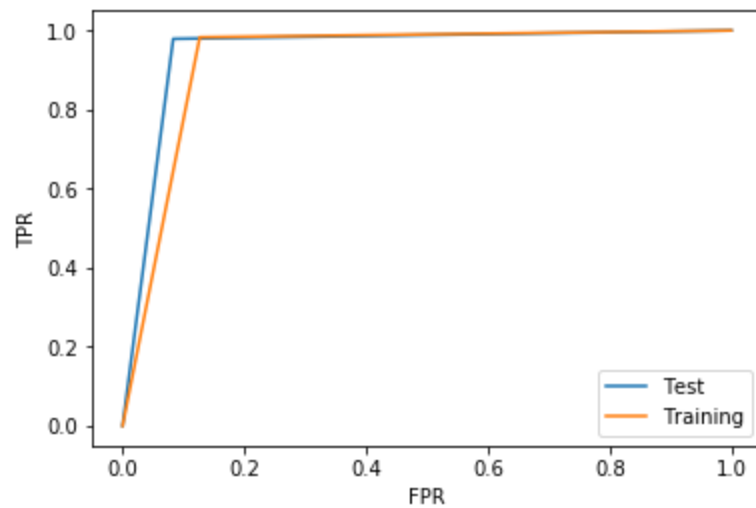
[[6665. 1012.]

[77. 4839.]]

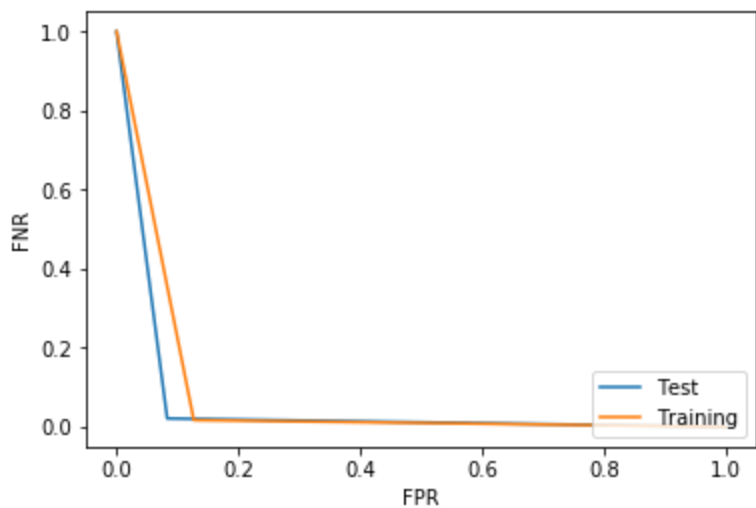
III.

A.

Stratified 5-Fold:



ROC:



DET:

Equal Error Rate(Test): Threshold(0.52)

Equal Error Rate(Training): Threshold(0.52)

B.

Confusion Matrix: Test

[[1111. 81.]

[24. 893.]]

Confusion Matrix: Training

[[6627. 742.]

[115. 5109.]]

2.

I.

3: 6131

8: 5851

6 : 6

II.

Randomized 5-Fold:

Validation

Mean: 0.5106010016694491

Variance: 3.146591007271448e-05

Training

Mean: 0.5103484247861465

Variance: 1.7809719639039933e-05

Stratified 5-Fold:

Validation

Mean: 0.41943286071726443

Variance: 0.02596425572881488

Training

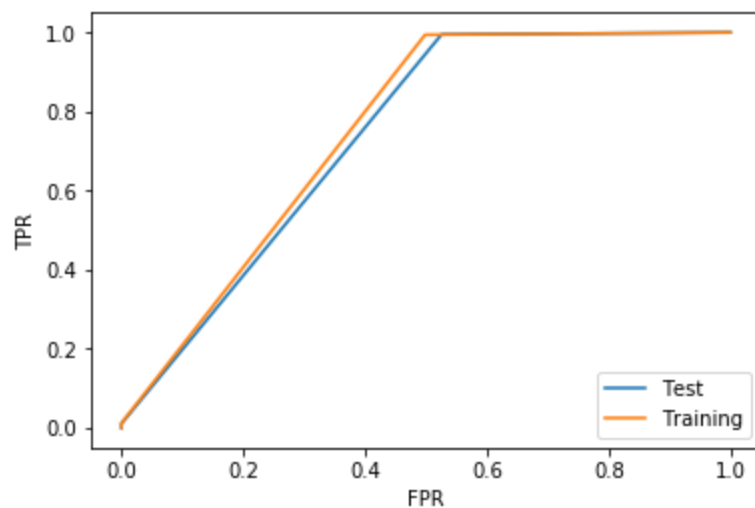
Mean: 0.464652165619374

Variance: 0.03514111615511832

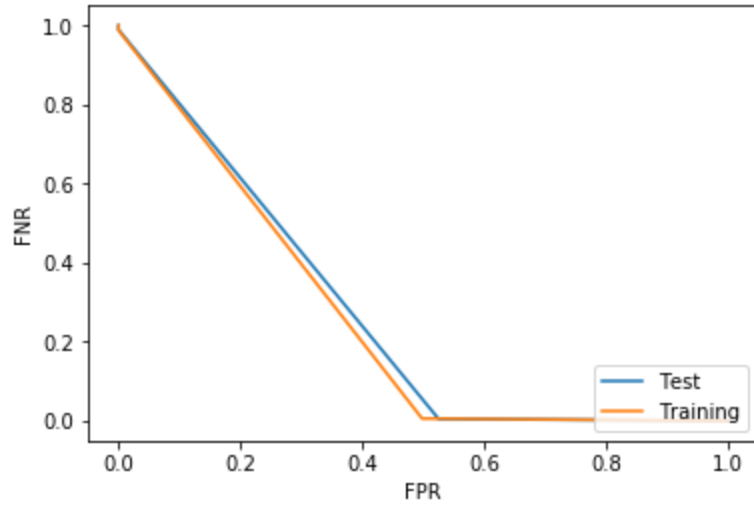
III.

A.

Randomized 5-Fold:



ROC:



DET:

Equal Error Rate(Test): Threshold(0.51)

Equal Error Rate(Training): Threshold(0.51)

B.

Confusion Matrix: Test

[[1005. 512.]

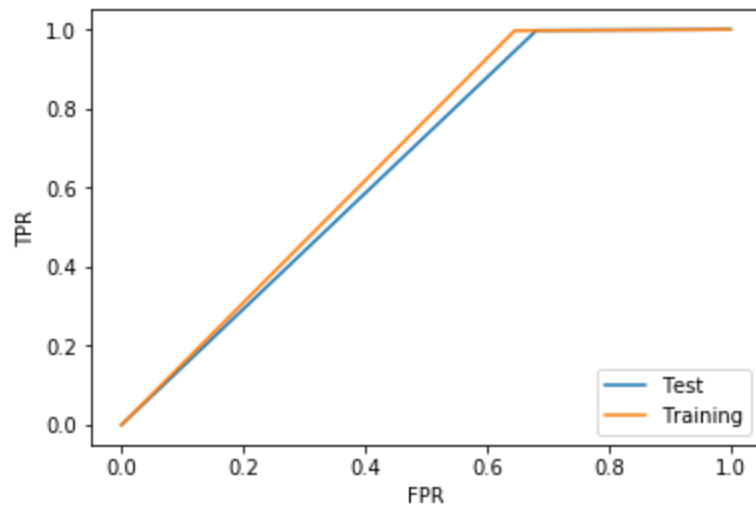
[5. 462.]]

Confusion Matrix: Training

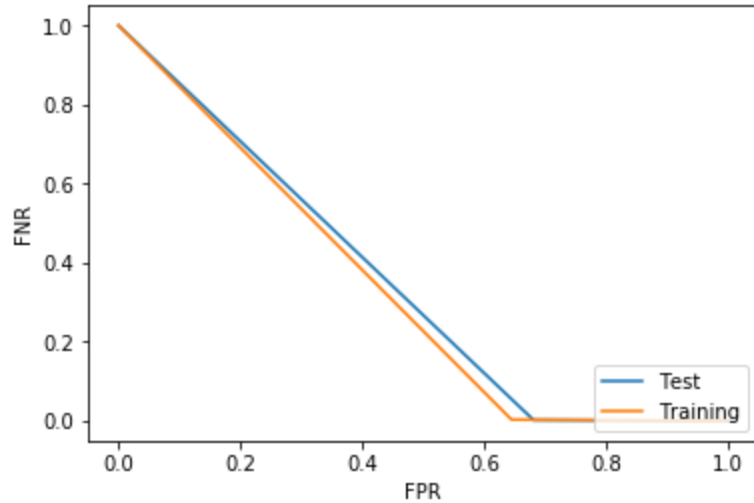
[[6095. 2917.]

[36. 2934.]]

Stratified 5-Fold:



ROC:



DET:

Equal Error Rate(Test): Threshold(0.55)

Equal Error Rate(Training): Threshold(0.55)

B.

Confusion Matrix: Test

[[1008. 664.]

[2. 310.]]

Confusion Matrix: Training

[[6112. 3777.]

[19. 2074.]]

The frequency of 3's(+ve Class) in the training data is less compared to that of 1's(+ve Class) relative to 8. 3 counts are almost equal to count of 8 hence the decision becomes difficult. Hence the accuracy comes out to be low for 3/8 than 1/8.

	3 and 8	1 and 8.
Number of items in Training	6131	6742
Ratio to 8	1:1	7:6
Best Randomize 5 Fold (Training Accuracy)	78%	91%
Best Randomize 5 Fold (Test Accuracy)	76%	90%
Best Stratified 5 Fold (Training Accuracy)	68%	92%

Best Stratified 5 Fold (Test Accuracy)	66%	94%
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Note:

Only True Positive are considered for true Identification Identification Accuracy.