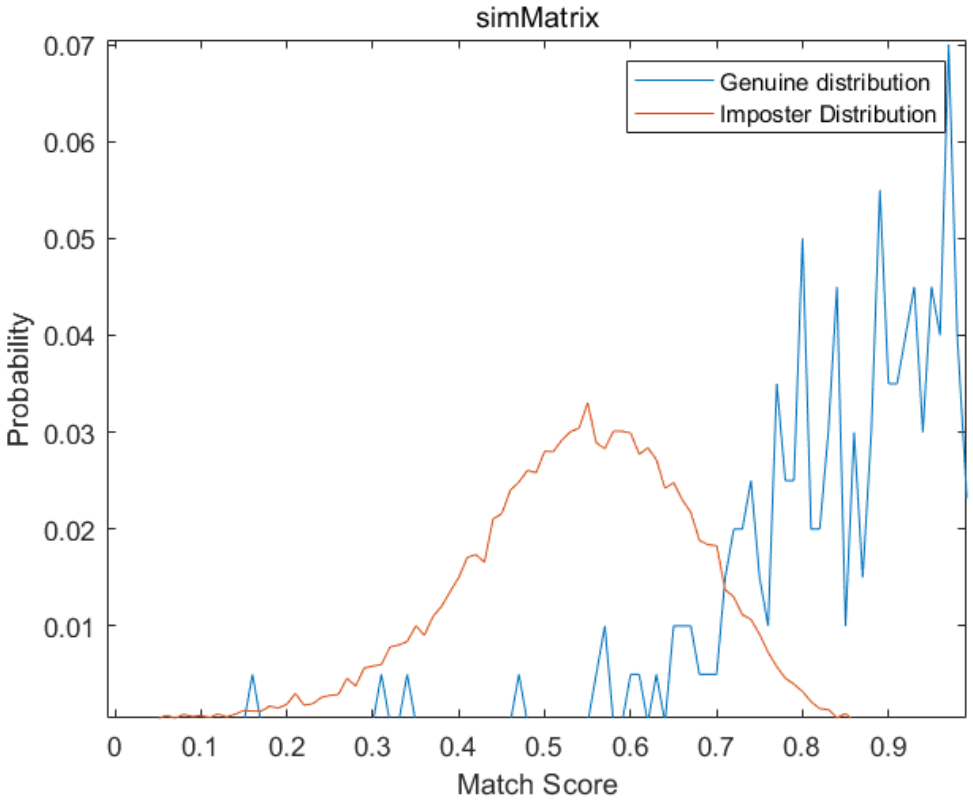
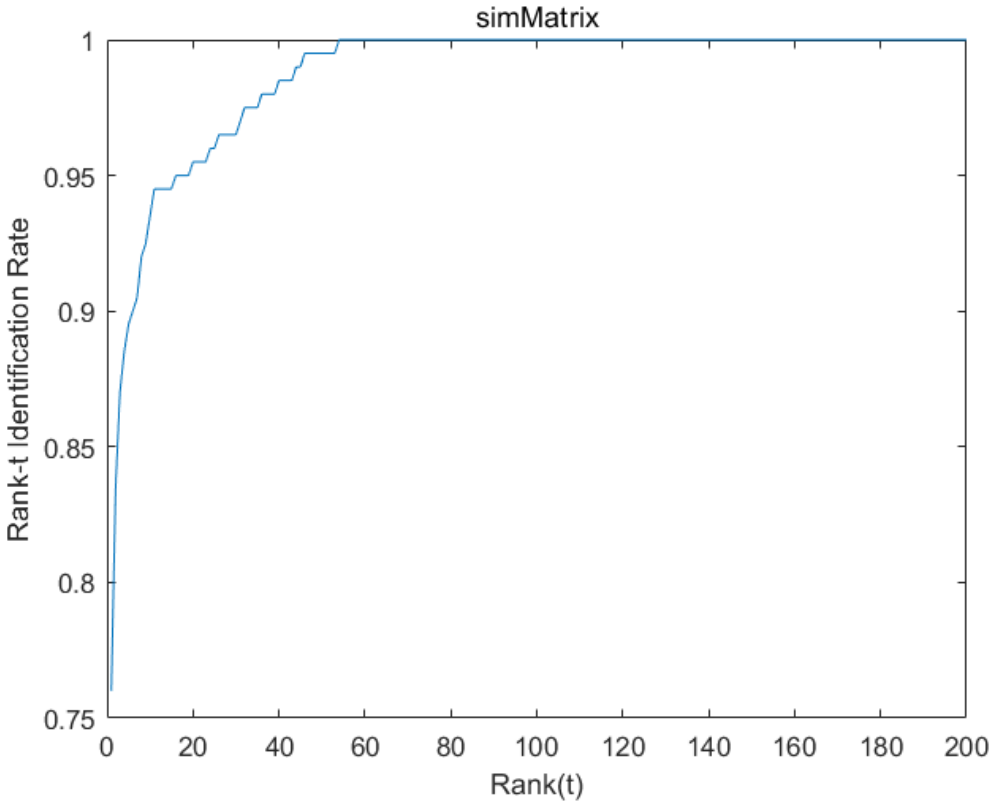
1. Entire face performance

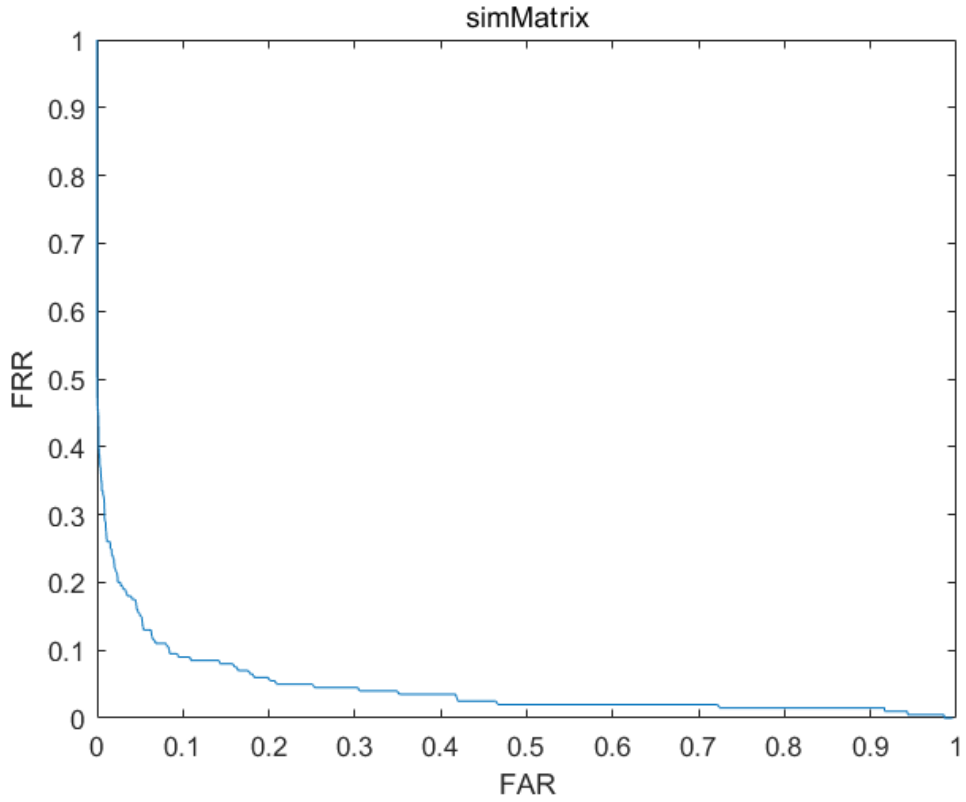
a) Genuine and impostor score distributions.



b) CMC curve



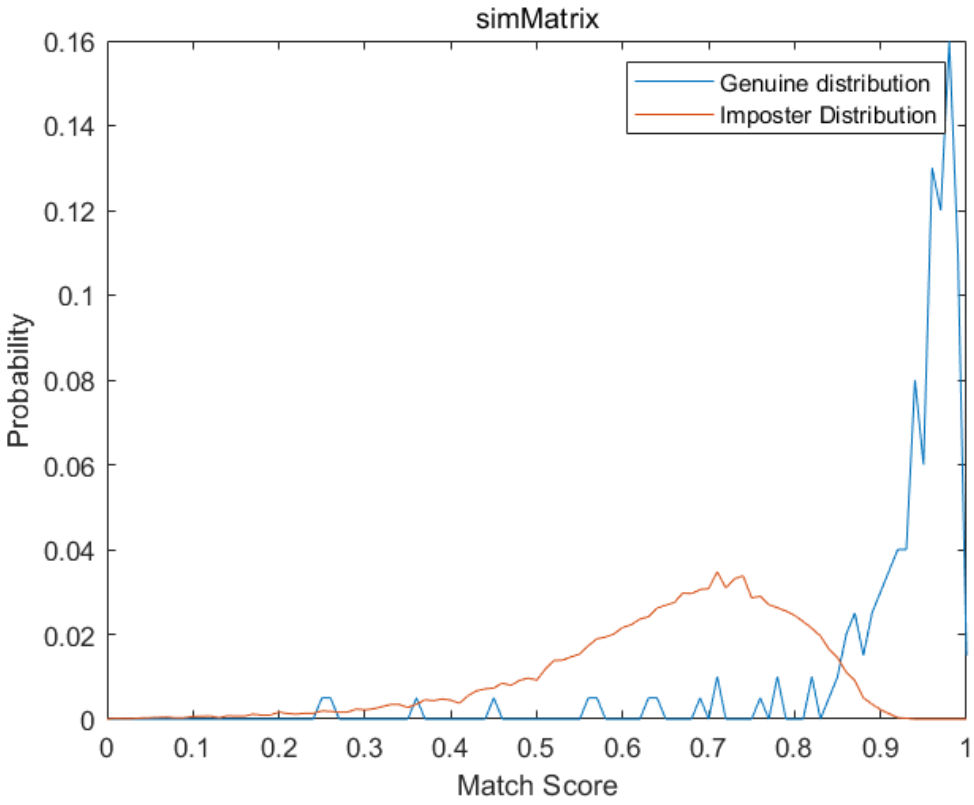
c) ROC



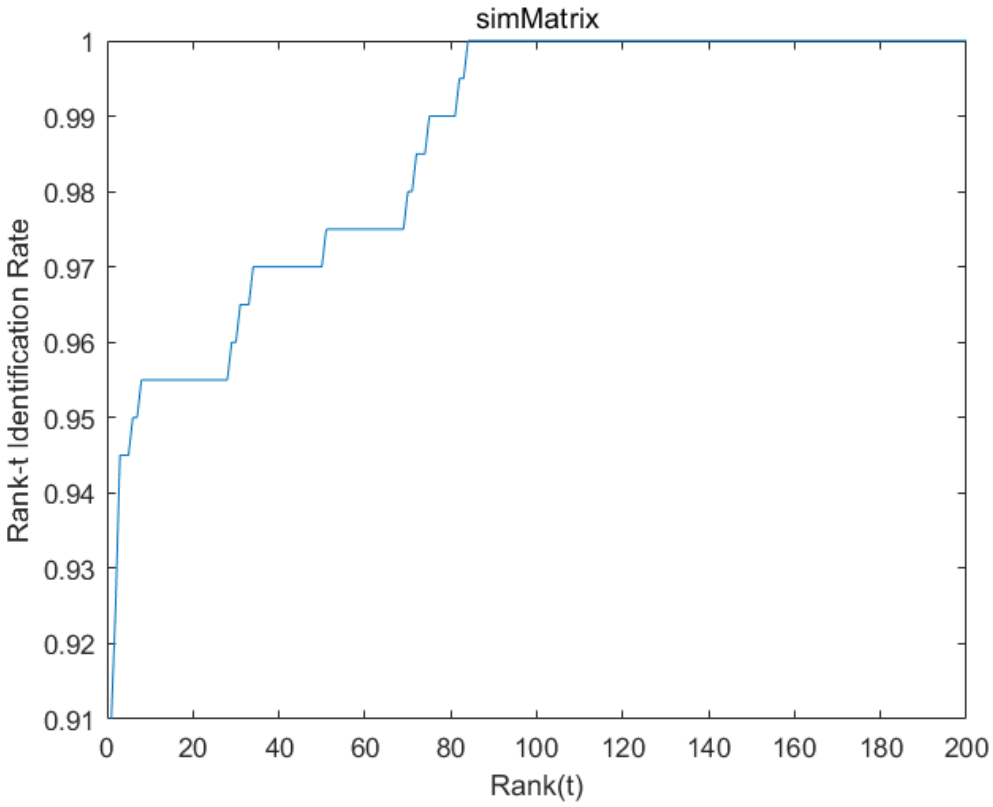
2. Partial face performance

Top half:

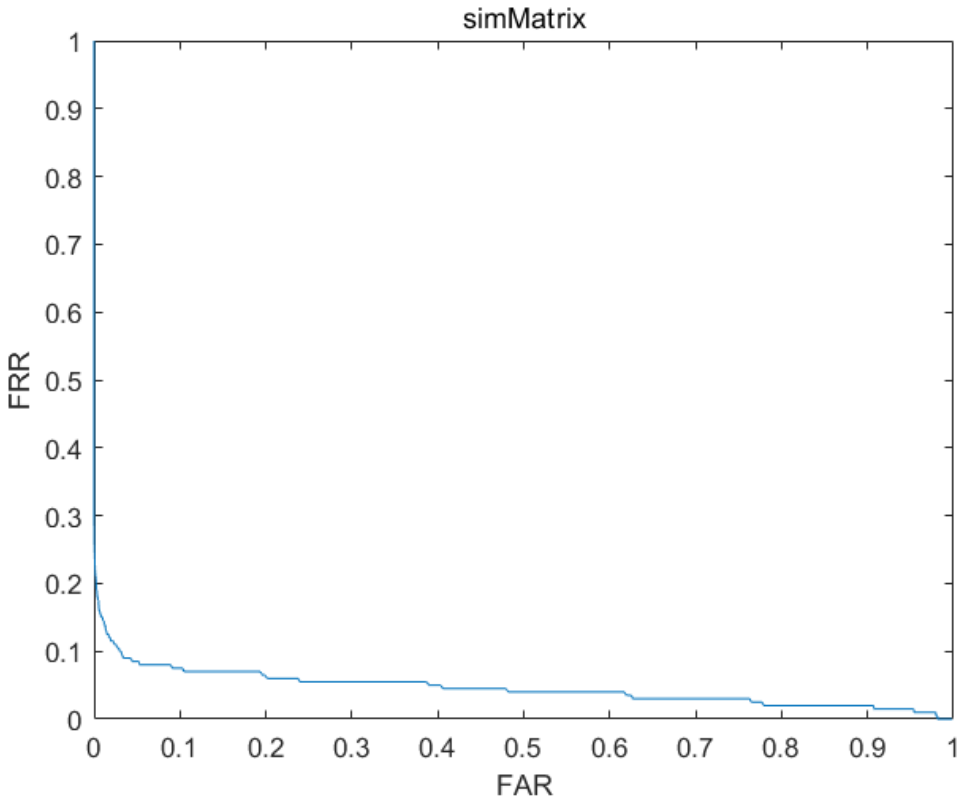
a) Genuine and impostor score distributions.



b) CMC curve

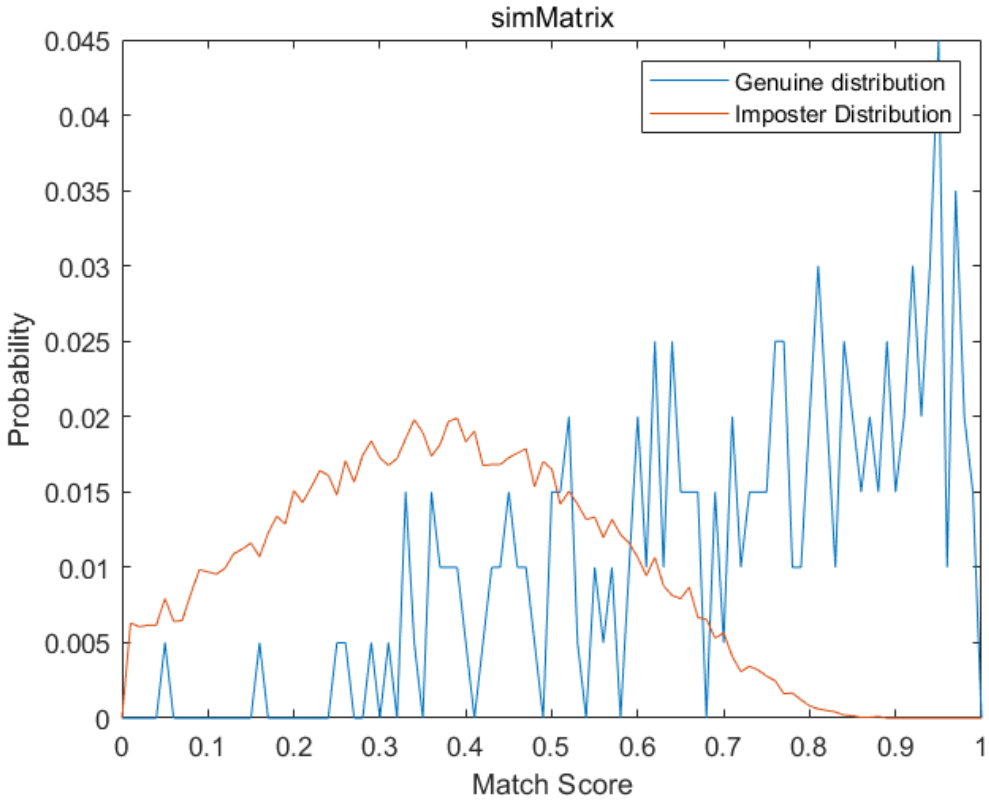


c) ROC

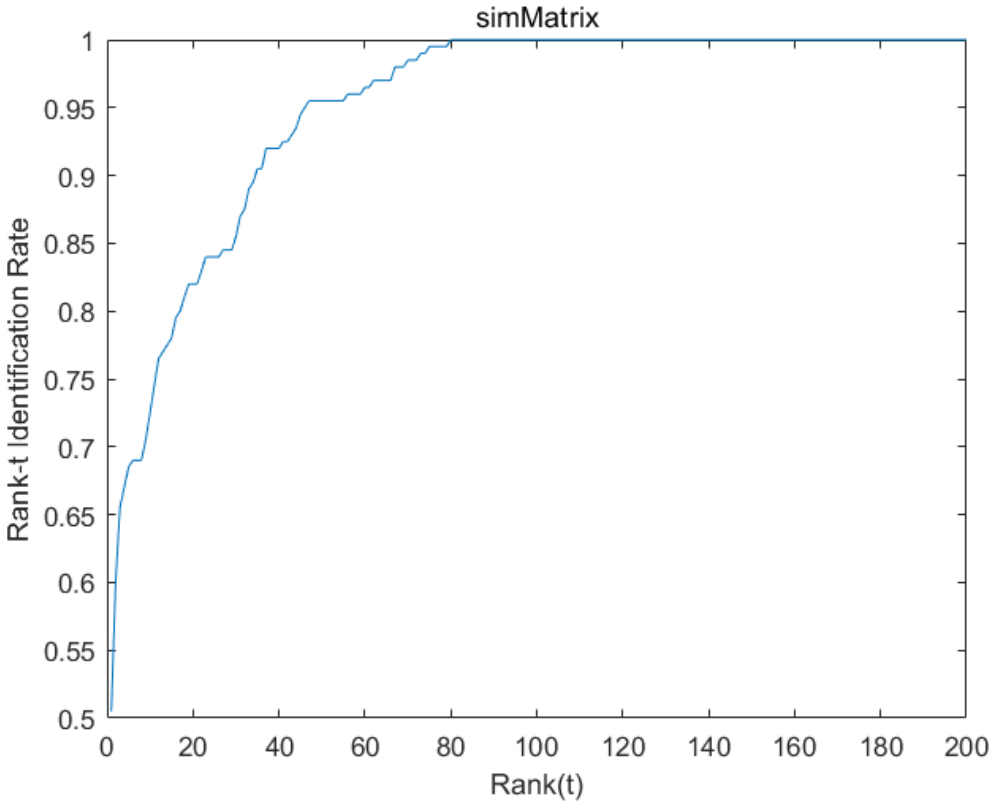


Bottom half:

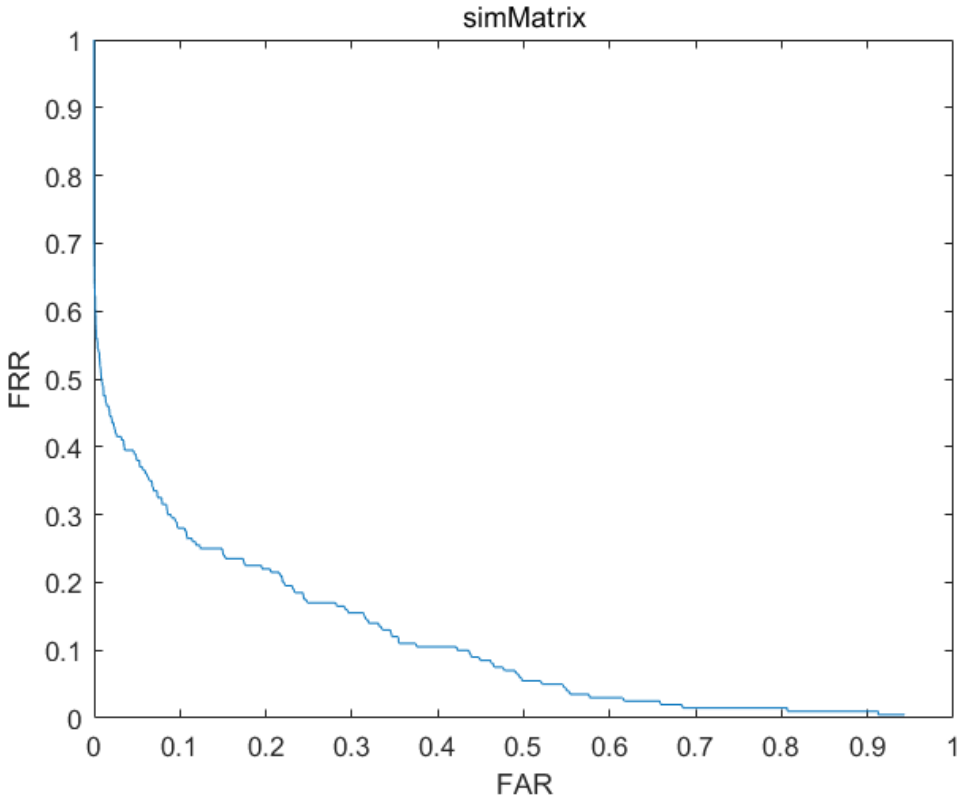
a) Genuine and impostor score distributions.



b) CMC curve

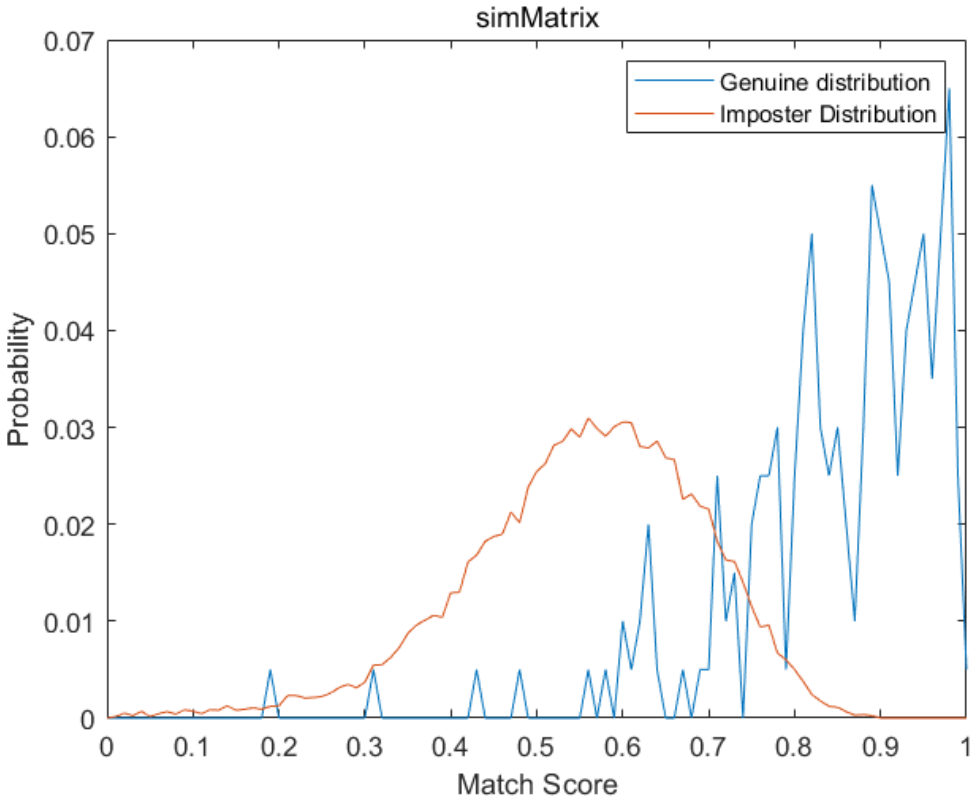


c) ROC

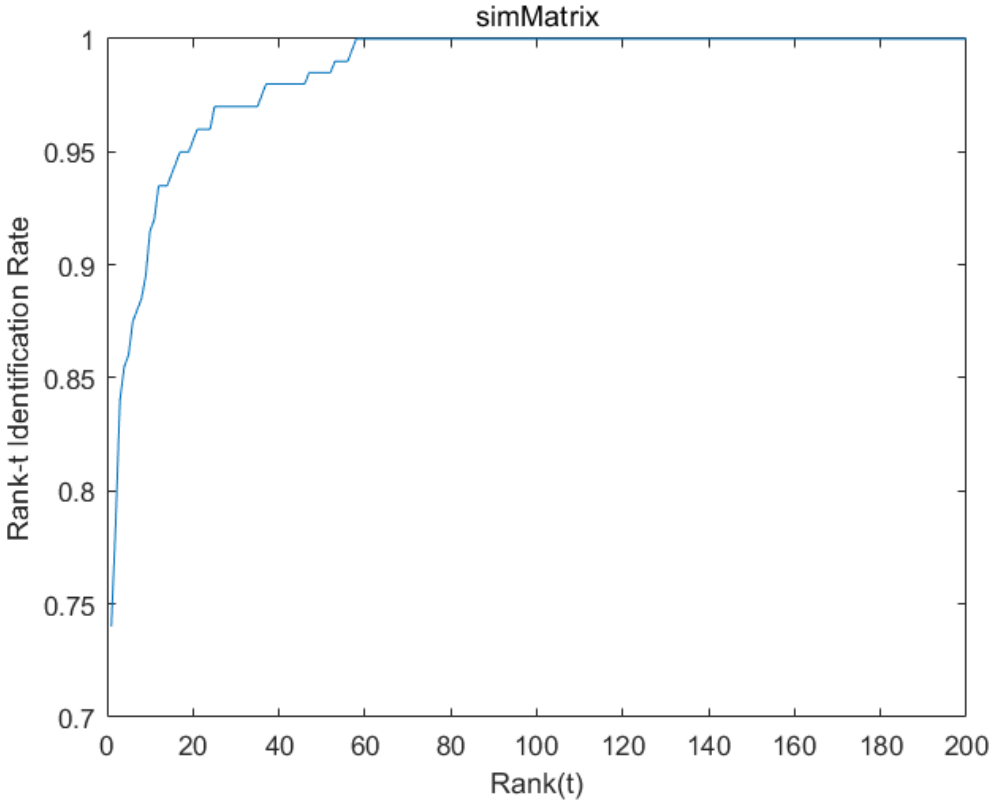


Left half:

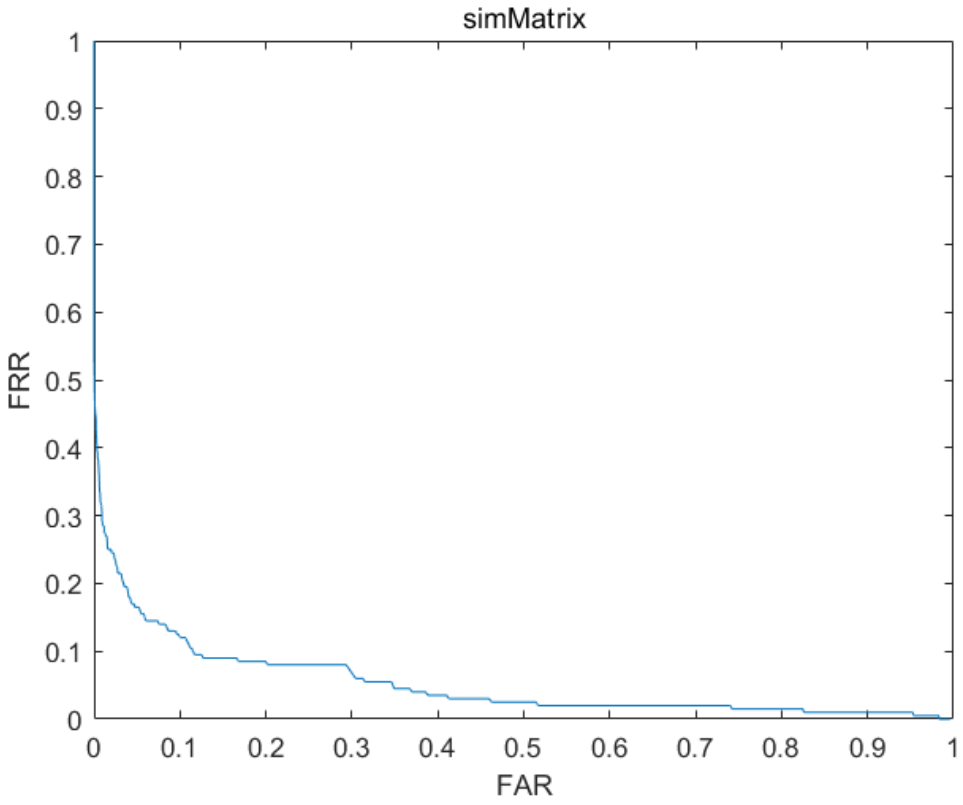
a) Genuine and impostor score distributions.



b) CMC curve

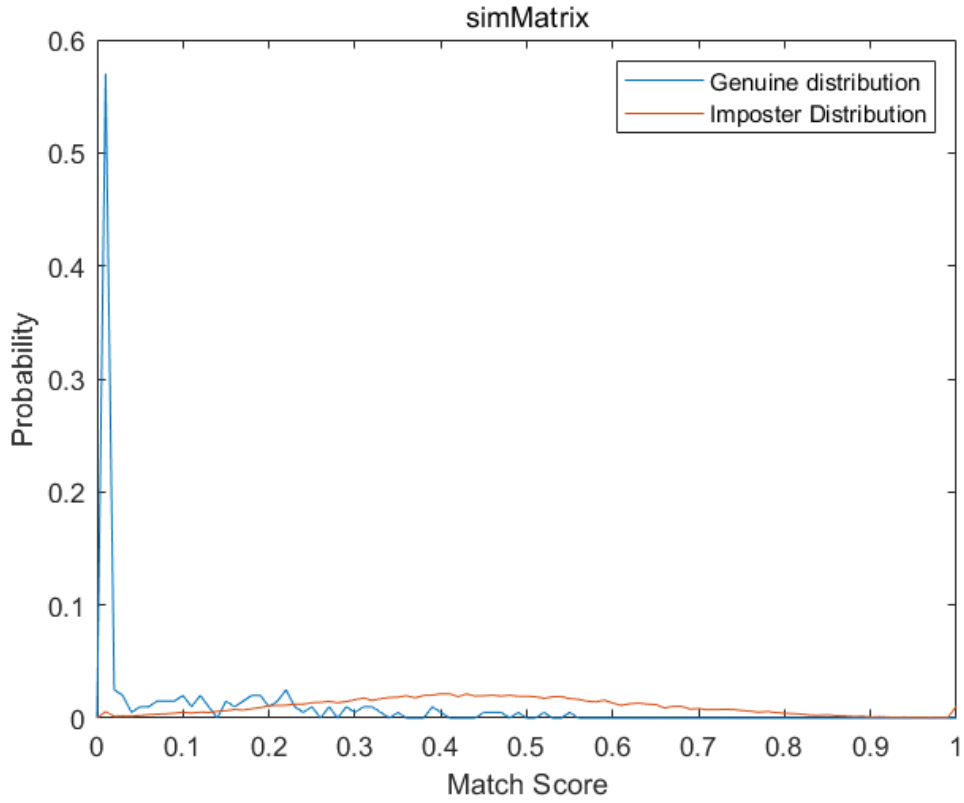

simMatrix
Rank-t Identification Rate
Rank(t)
1
0.95
0.9
0.85
0.8
0.75
0.7
0
20
40
60
80
100
120
140
160
180
200

c) ROC

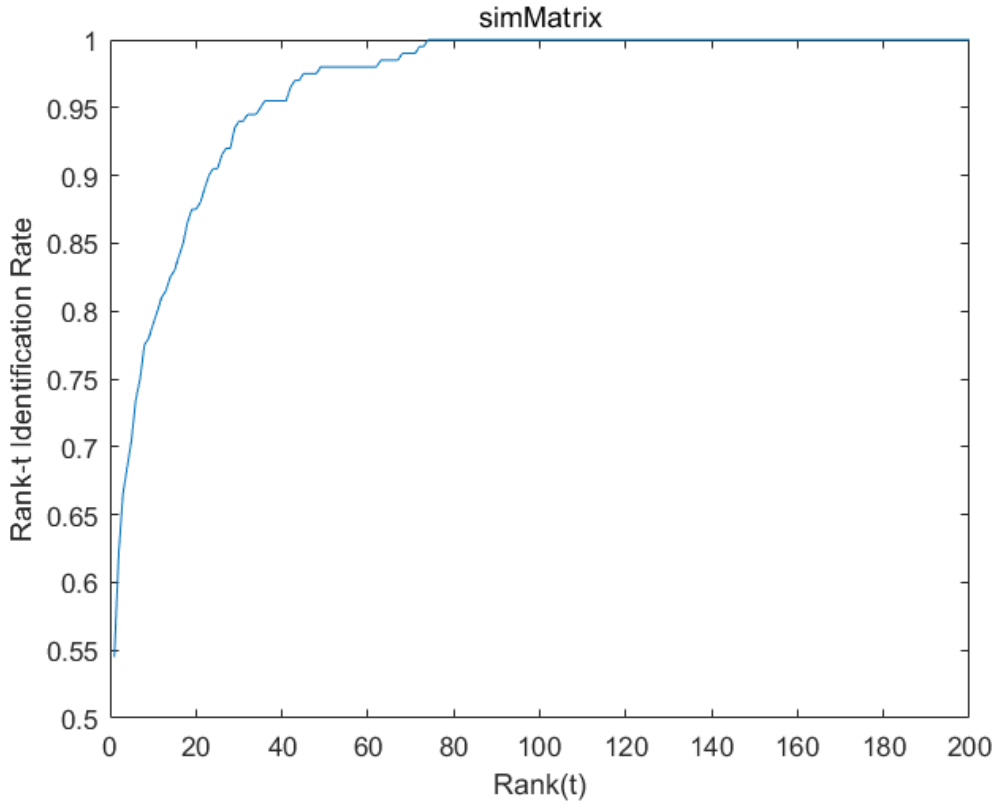

simMatrix
FRR
FAR
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

Right half:

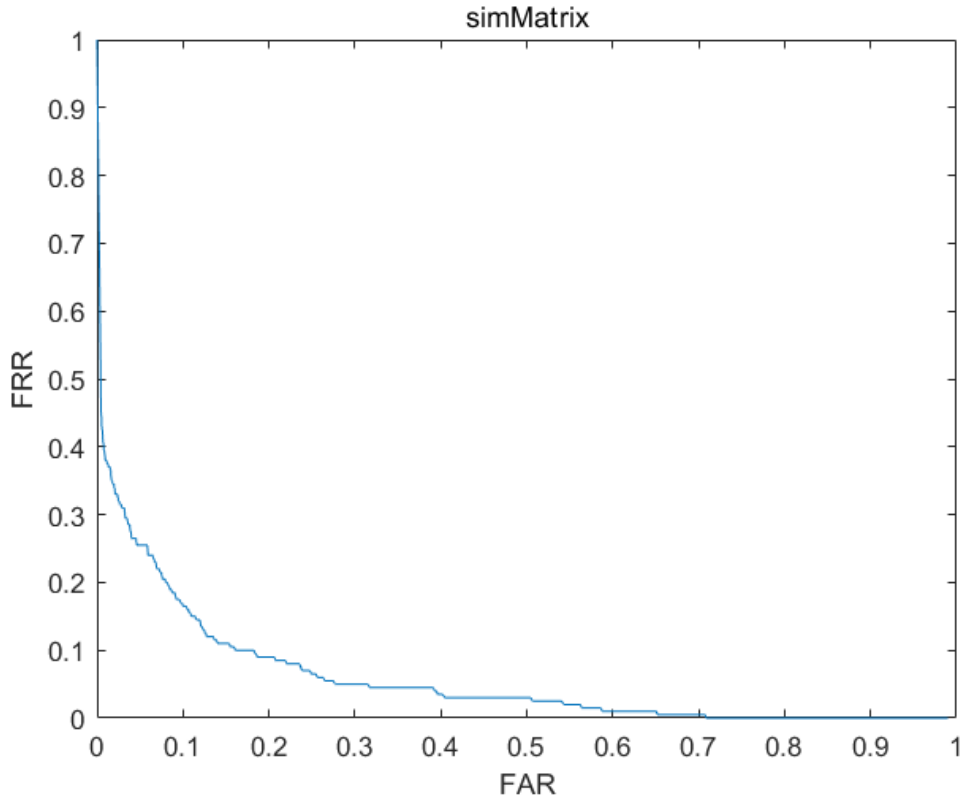
a) Genuine and impostor score distributions.



b) CMC curve



c) ROC



Except genuine and impostor score distributions, CMC and ROC curves. D-prime values and EER are also used to evaluate.

Whole face:

D-prime: 2.3339

EER: 0.0932

The lowest rank at which the system achieves performance greater than 80%: Rank 2.

FAR	1%	20%
FRR	29%	6 %

Top half:

D-prime: 2.0589

EER: 0.0793

The lowest rank at which the system achieves performance greater than 80%: Rank 1.

FAR	1%	20%
FRR	15%	6.5%

Bottom half:

D-prime: 1.7667

EER: 0.2152

The lowest rank at which the system achieves performance greater than 80%: Rank 18.

FAR	1%	20%
FRR	49%	22%

Left half:

D-prime: 2.2246

EER: 0.1102

The lowest rank at which the system achieves performance greater than 80%: Rank 3.

FAR	1%	20%
FRR	28.5%	8.5%

Right half:

D-prime: 2.2599

EER: 0.1108

The lowest rank at which the system achieves performance greater than 80%: Rank 2.

FAR	1%	20%
FRR	32%	6.5%

The curves and numbers of left and right part of the face are close to whole face.

1) Similar overlap in genuine and impostor score distributions.
2) Similar CMC curve and ROC curve.
3) Similar d-prime value and equal error rate.
4) Similar FRR value when having the same FAR value.

Top face performance the best.

1) Lesser overlap in genuine and impostor score distributions.
2) The CMC curve rises faster.
3) More ideal ROC curve.
5) Smaller equal error rate.
6) Lower FRR value than others when having the same FAR value.

Yes.

The performance numbers obtained using the partial face are expected except d-prime value of bottom half face. Because top face is more important and contains more information in facial recognition. And bottom face is not so important.

All distributions are not exactly the Gaussian distributions, so d-prime value is not so precise because it assuming all distributions are Gaussian distributions.

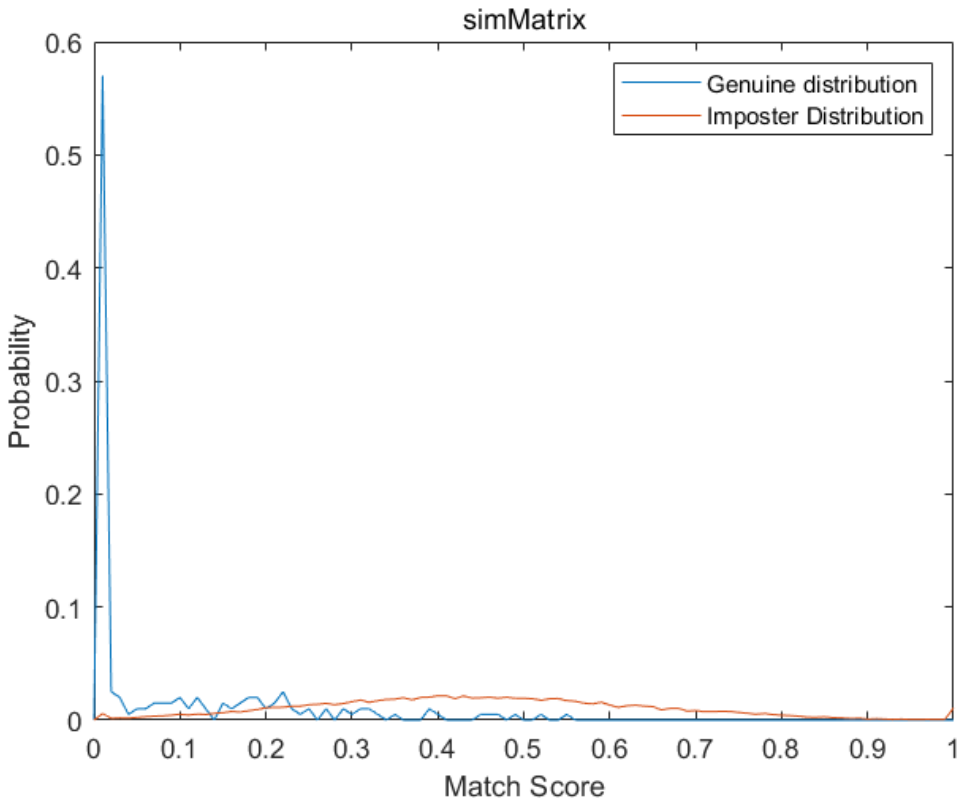
We could weight top face more than the bottom face in whole face recognition, while we weight same at left and right face to get the system improved.

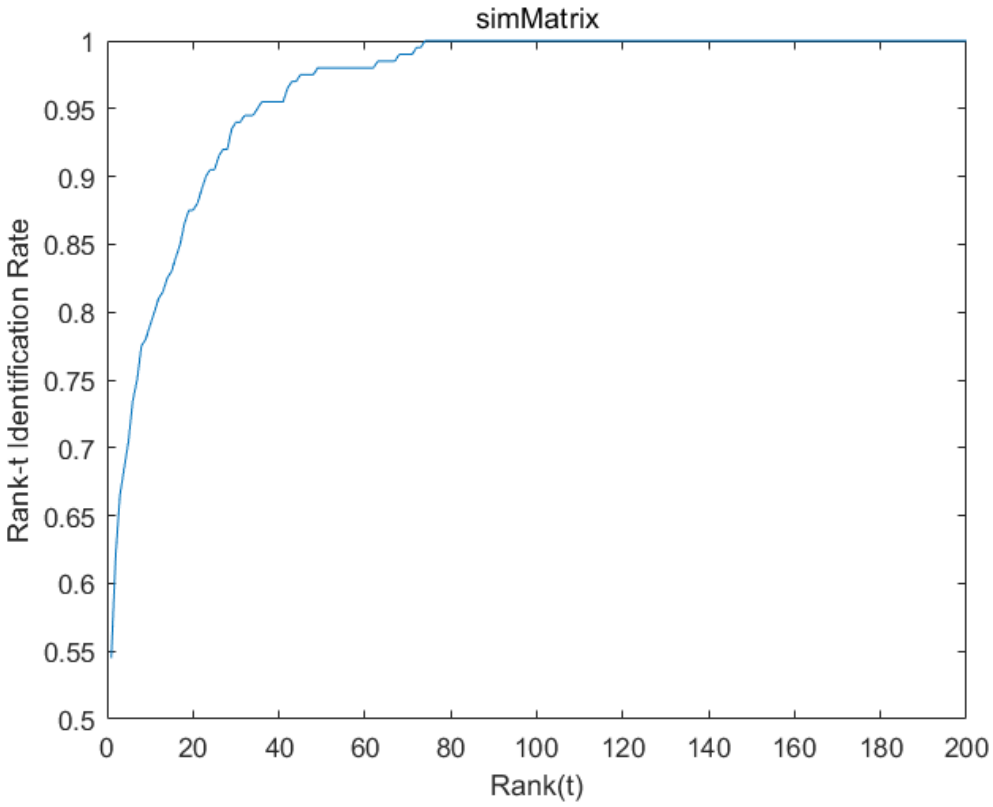
PCA

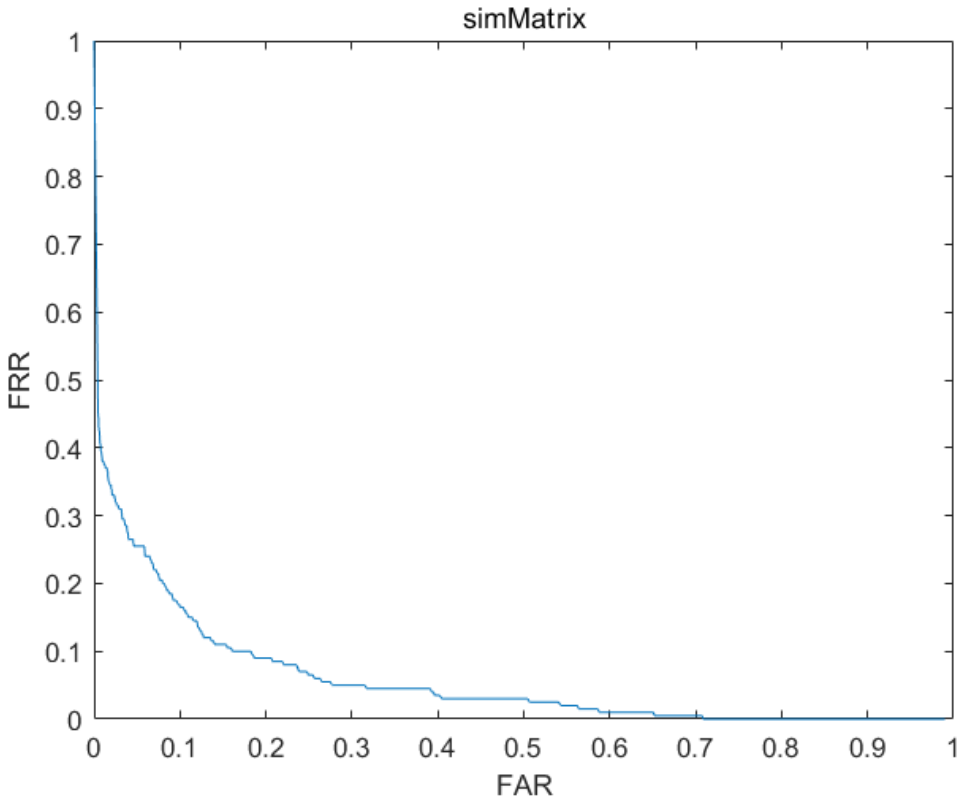
For all pca parts, K eigenvectors are kept so first k eigenvalues contribute more than 90% of the first 50 eigenvalues.

Whole face.

44 eigenvectors.

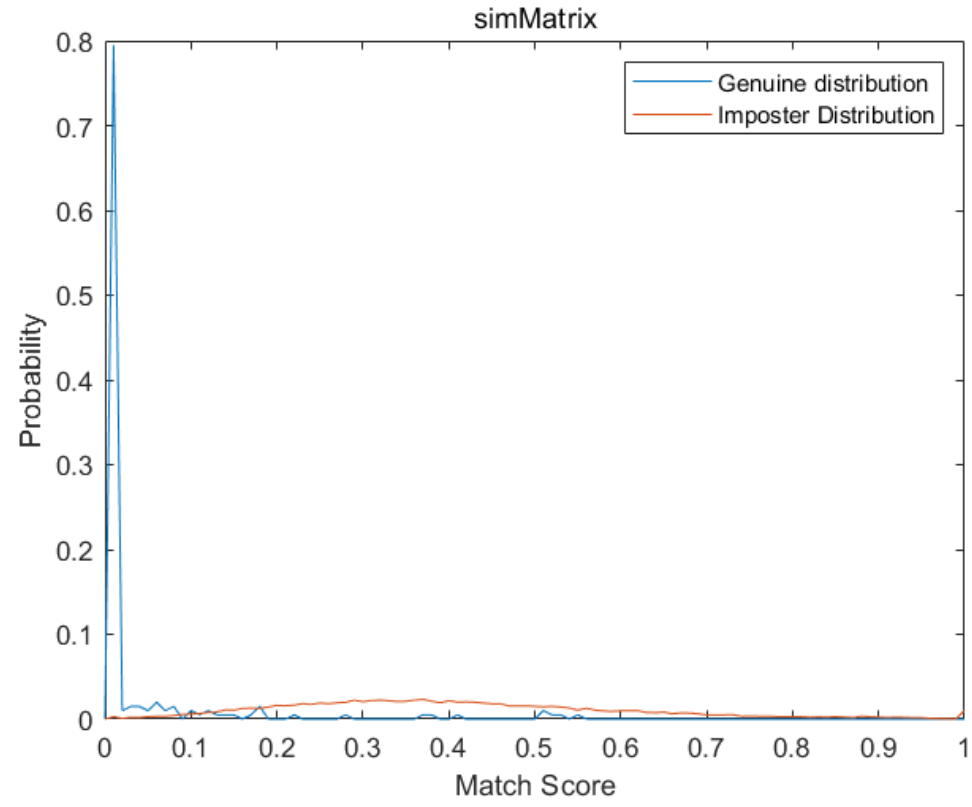


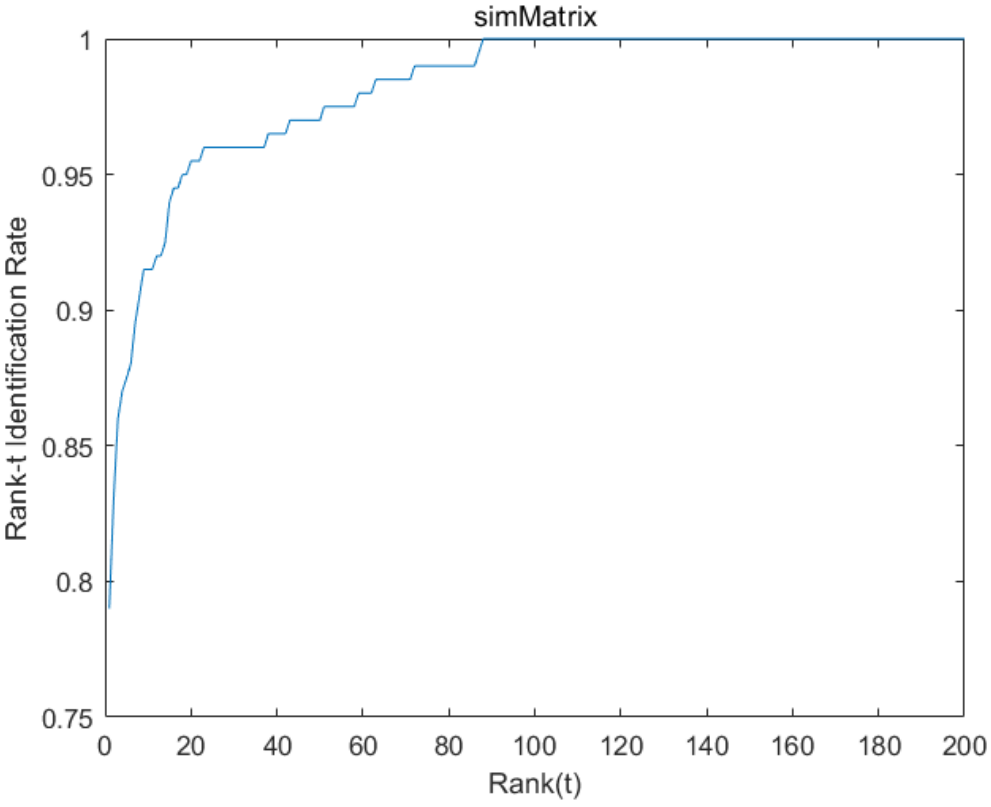


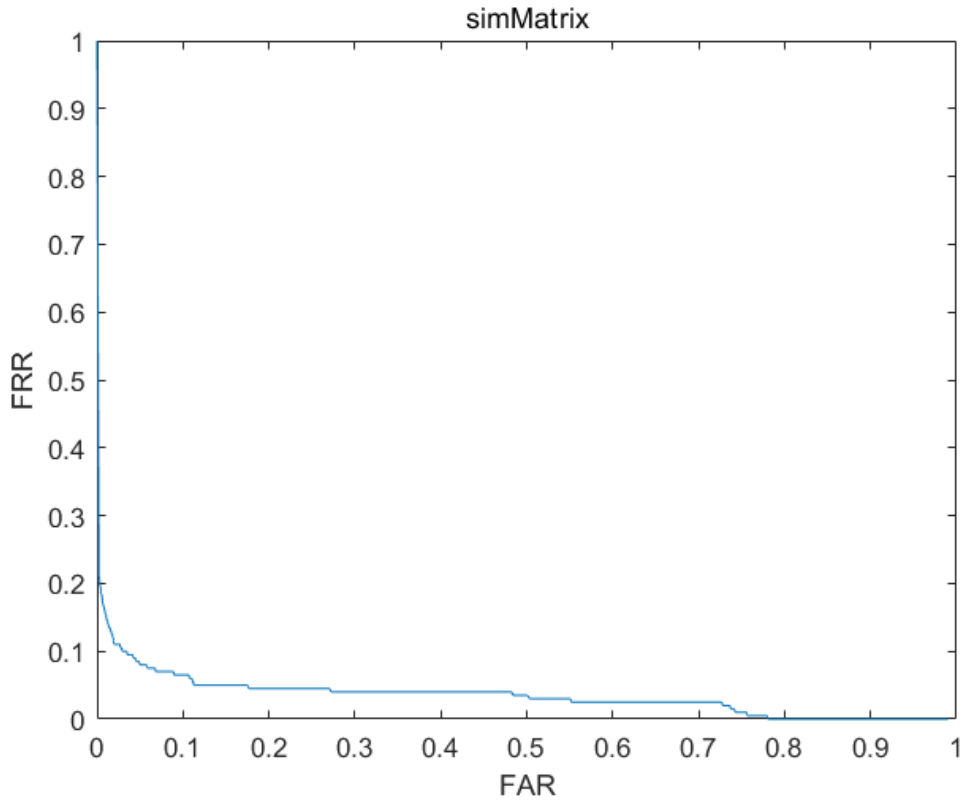


Top half

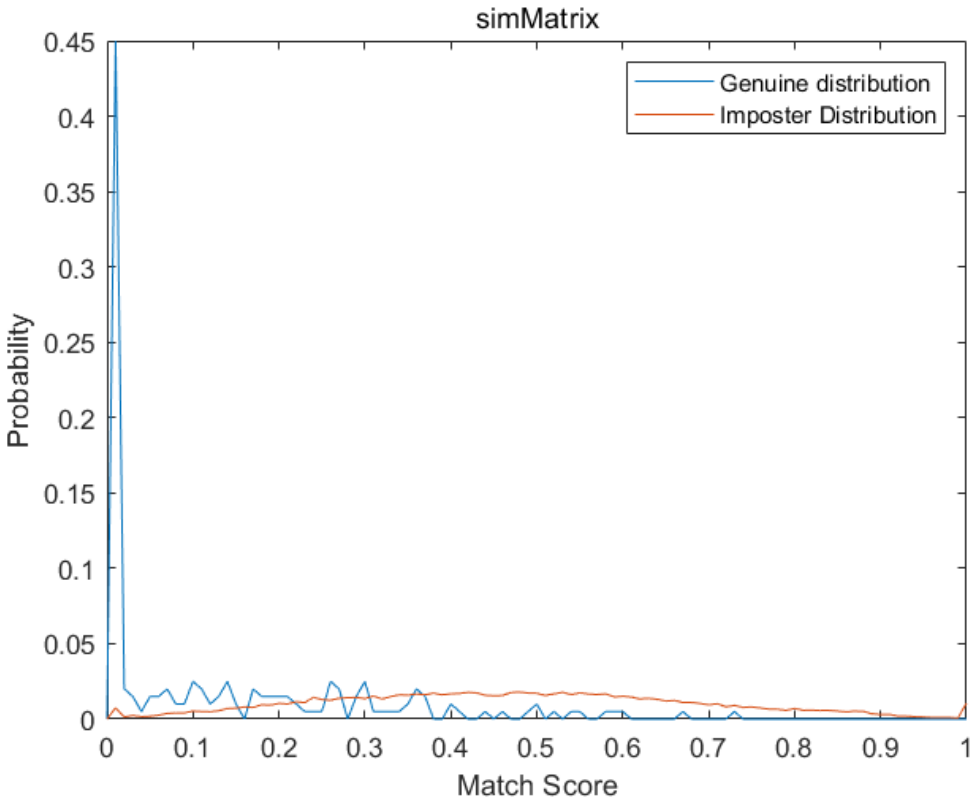
34 eigenvectors.

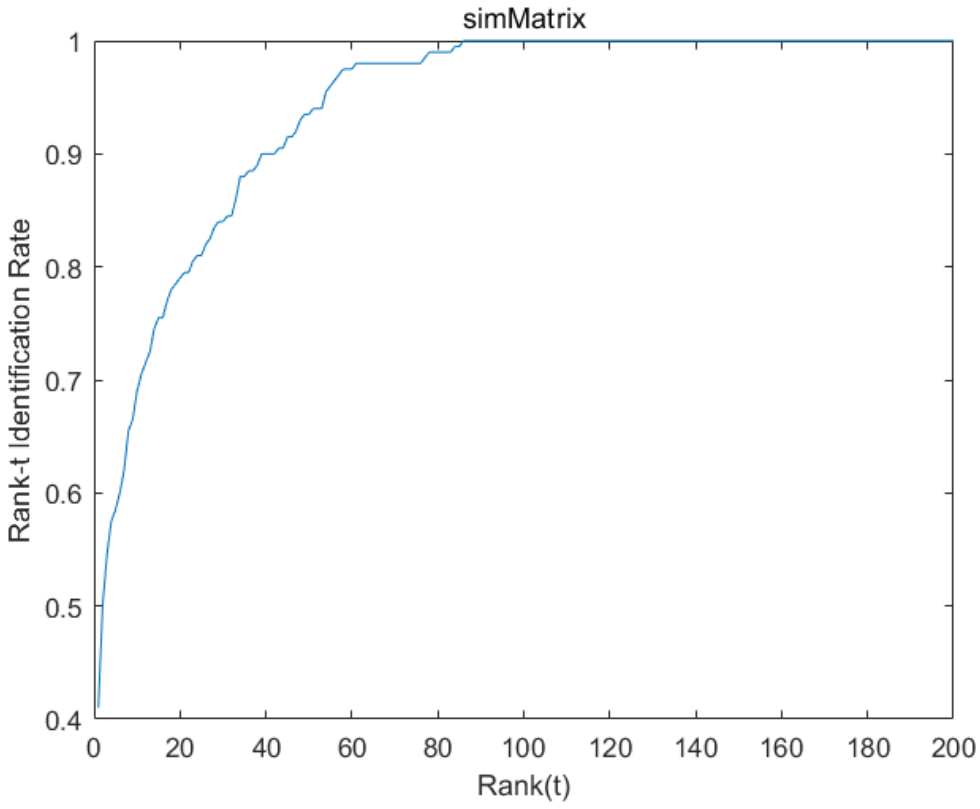

simMatrix
Genuine distribution
Imposter Distribution
Probability
Match Score
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

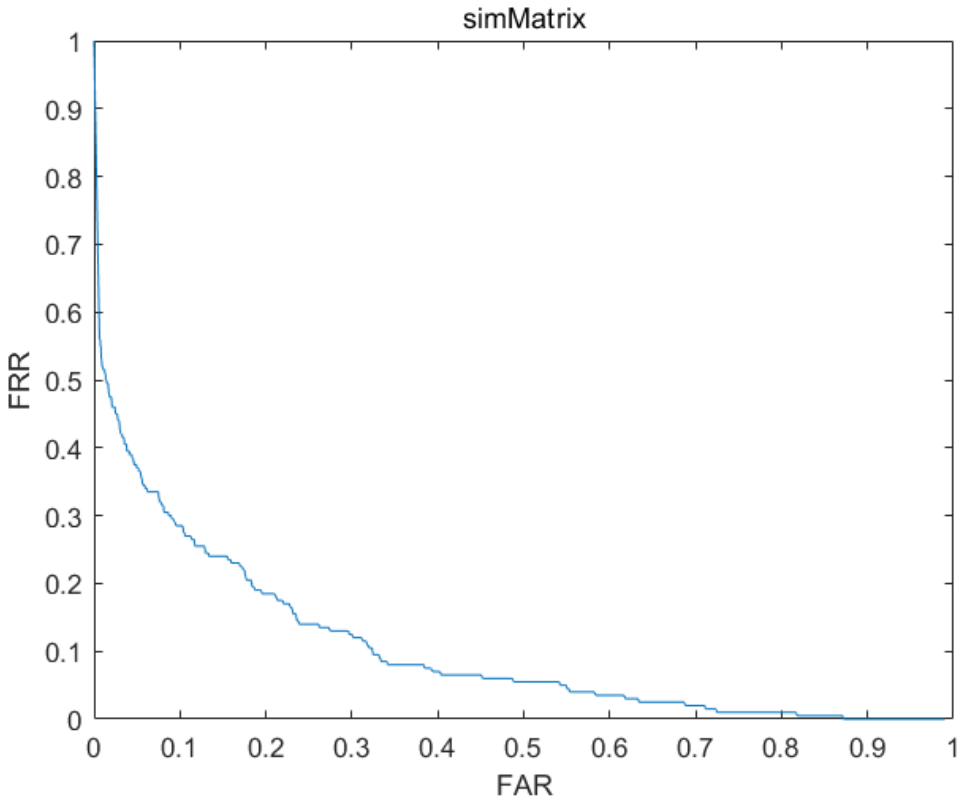

simMatrix
Rank-t Identification Rate
Rank(t)
0.75
0.8
0.85
0.9
0.95
1
0
20
40
60
80
100
120
140
160
180
200



Bottom half
33 eigenvectors.

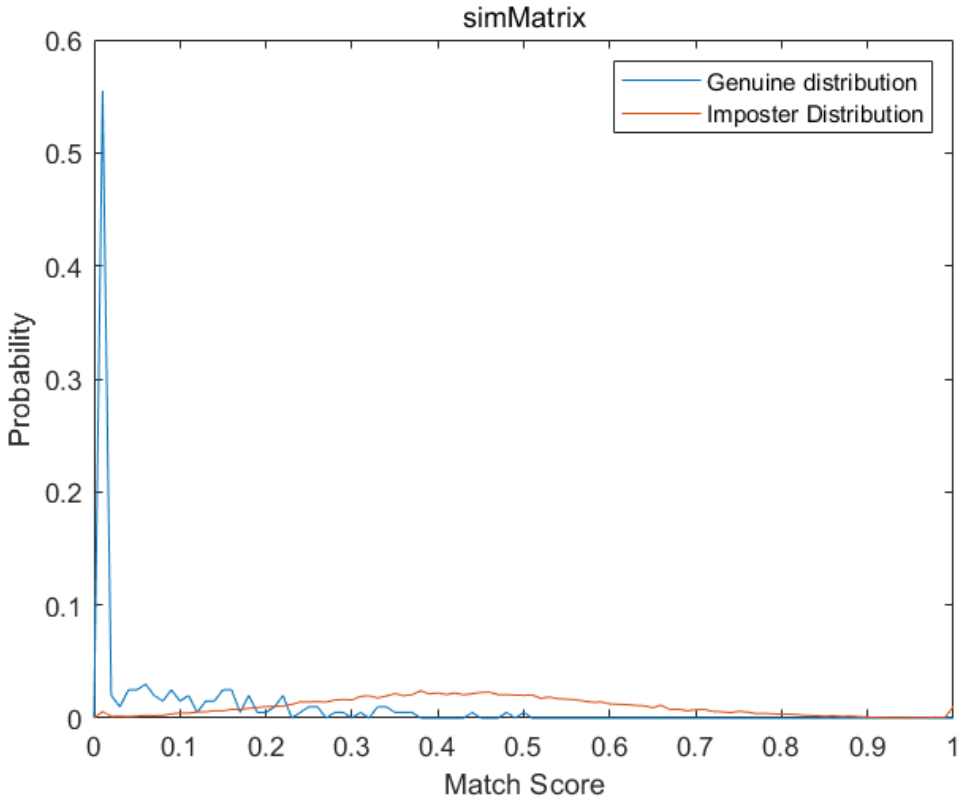

simMatrix
Genuine distribution
Imposter Distribution
Probability
Match Score
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1

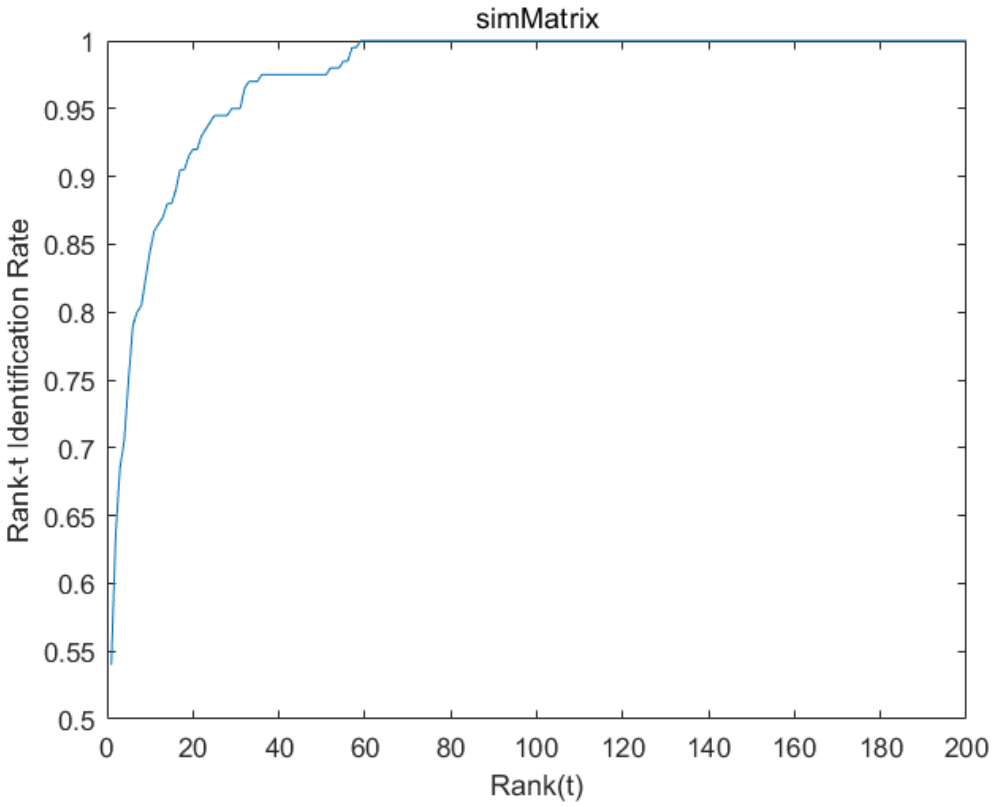

simMatrix
Rank-t Identification Rate
Rank(t)
1
0.9
0.8
0.7
0.6
0.5
0.4
0
20
40
60
80
100
120
140
160
180
200

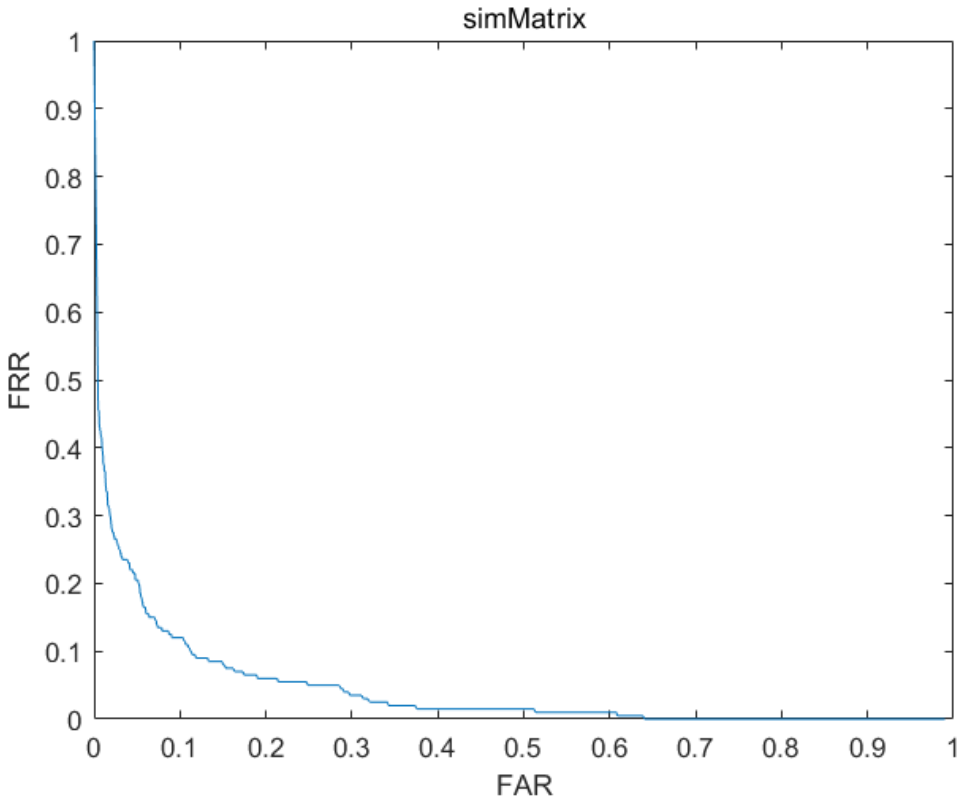


Left half

37 eigenvectors.

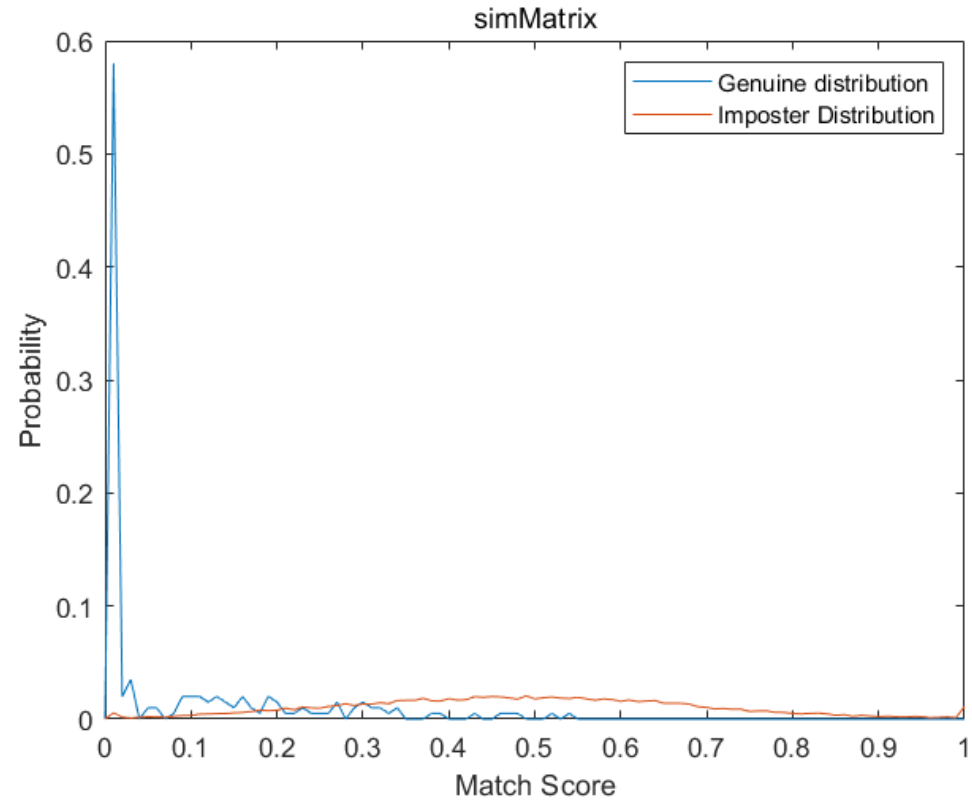


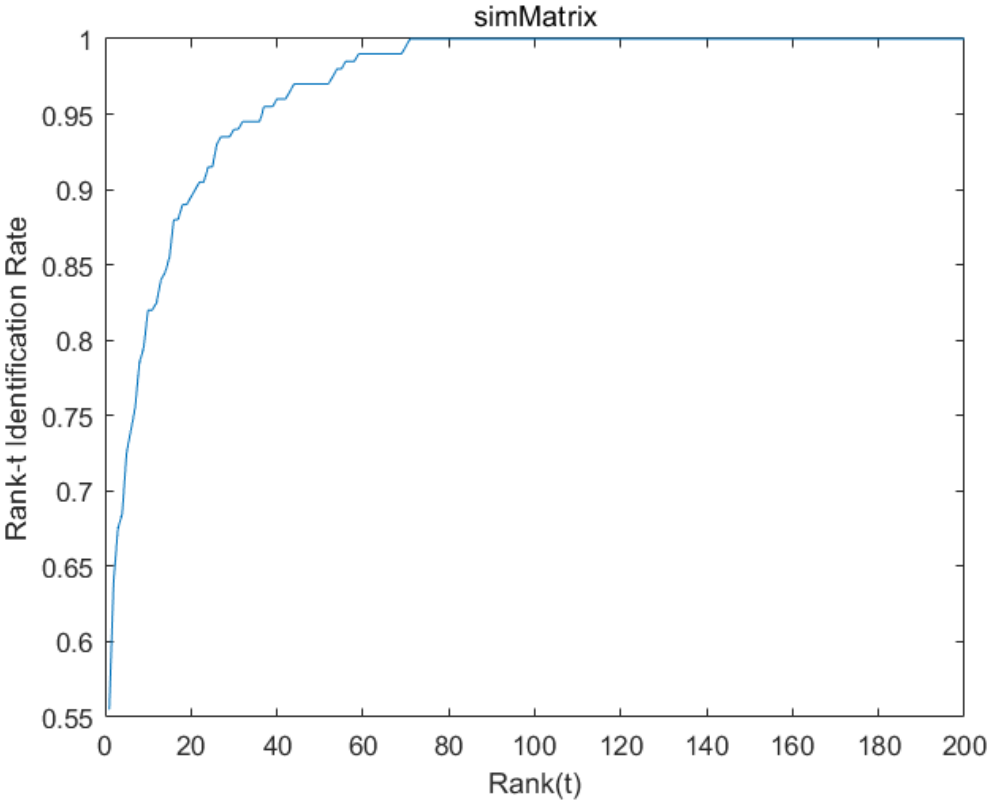


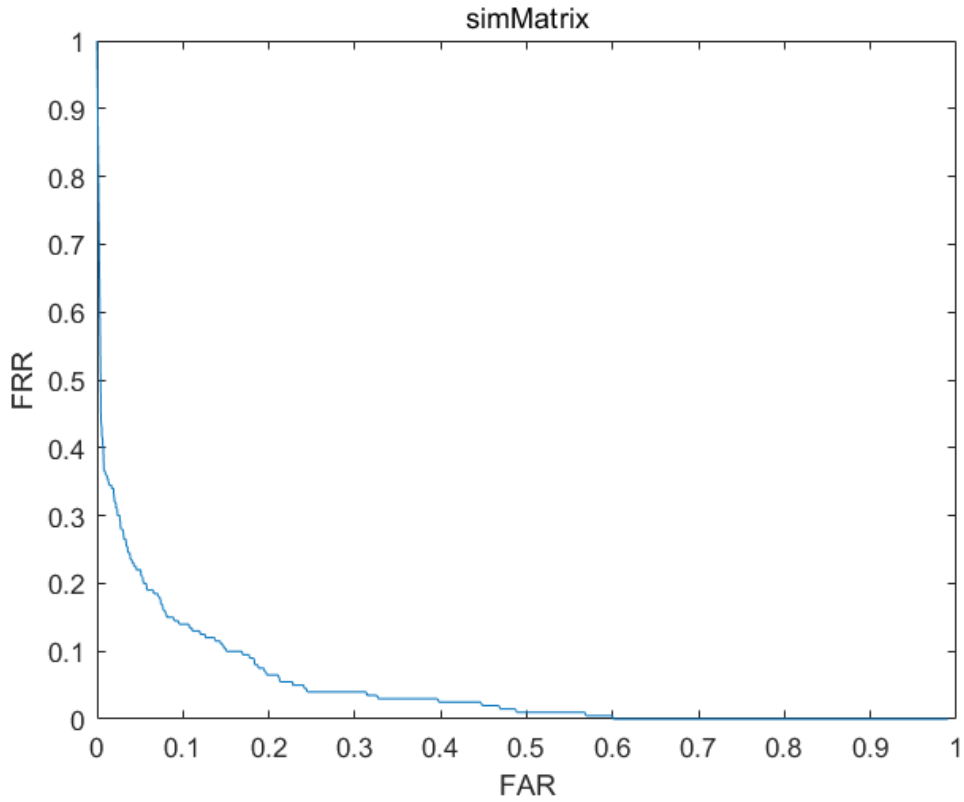


Right half

37 eigenvectors.


simMatrix
Genuine distribution
Imposter Distribution
Probability
Match Score
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0.9
1


simMatrix
Rank-t Identification Rate
Rank(t)
1
0.95
0.9
0.85
0.8
0.75
0.7
0.65
0.6
0.55
0
20
40
60
80
100
120
140
160
180
200



Whole face:

D-prime: 2.4444

EER: 0.1258

The lowest rank at which the system achieves performance greater than 80%: Rank 12.

FAR	1%	20%
FRR	39%	9%

Top half:

D-prime: 2.3577

EER: 0.0702

The lowest rank at which the system achieves performance greater than 80%: Rank 2.

FAR	1%	20%
FRR	15.5%	4.5 %

Bottom half:

D-prime: 1.7988

EER: 0.1902

The lowest rank at which the system achieves performance greater than 80%: Rank 23.

FAR	1%	20%
FRR	52%	18.5 %

Left half:

D-prime: 2.4343

EER: 0.1089

The lowest rank at which the system achieves performance greater than 80%: Rank 8.

FAR	1%	20%
FRR	39.5%	6 %

Rigth half:

D-prime: 2.4174

EER: 0.1254

The lowest rank at which the system achieves performance greater than 80%: Rank 10.

FAR	1%	20%
FRR	36%	6.5 %

Yes, the result agree with those obtained using correlation based facial recognition but a little worse.

PCA reduce the dimension but lose a little bit information. So the result is very similar with correlation but not as good as correlation due to smaller variance.