EECS 495 : Biometrics Assignment 1

Prepared by

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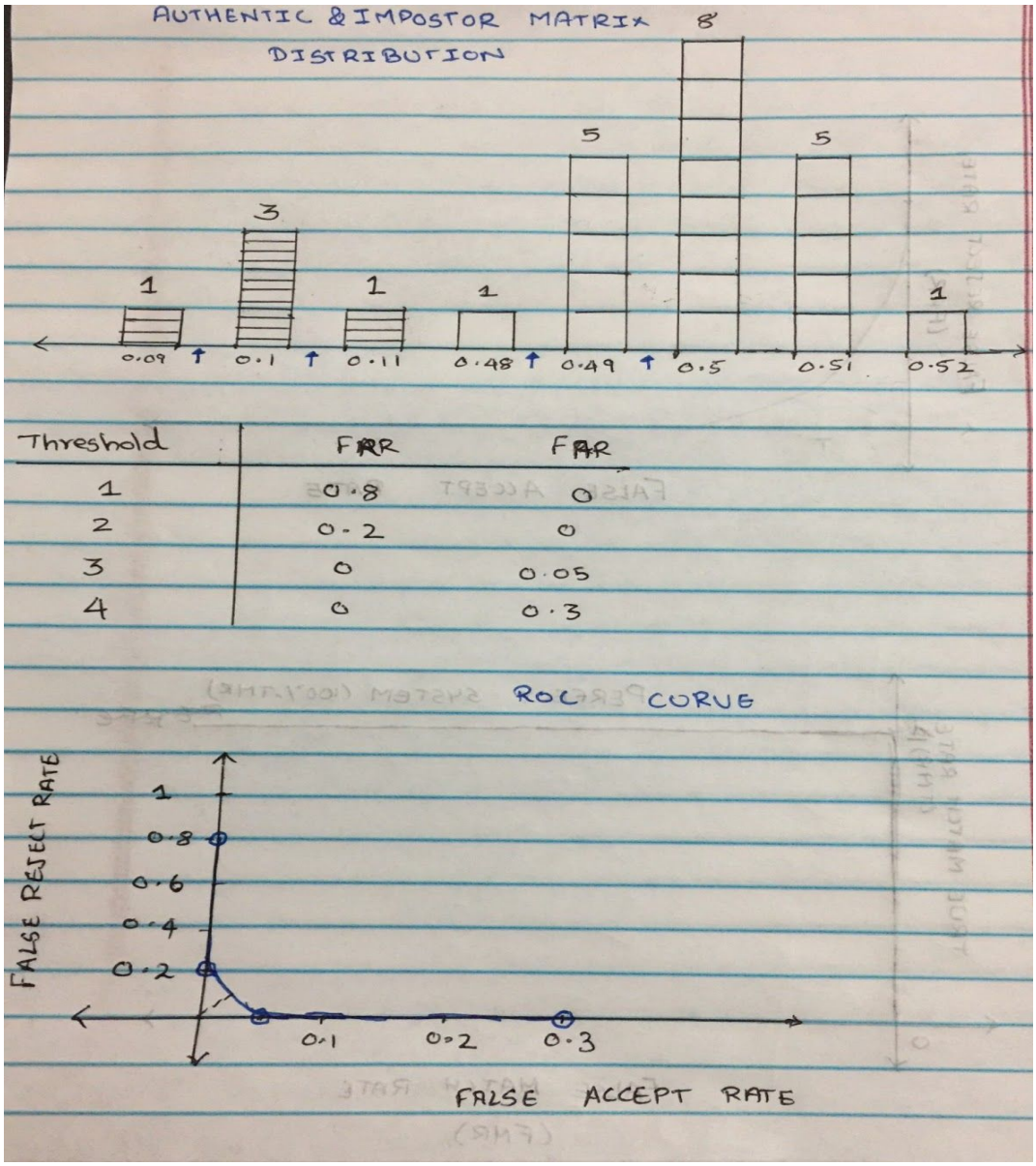
1. Plot imposter and genuine distributions and corresponding ROC curve according to the case below. A, B, C, D, E five subject's iris match scores are listed in the table. 0.0 = complete agreement; 0.5 = random agreement; 1.0 = complete difference

Answer:

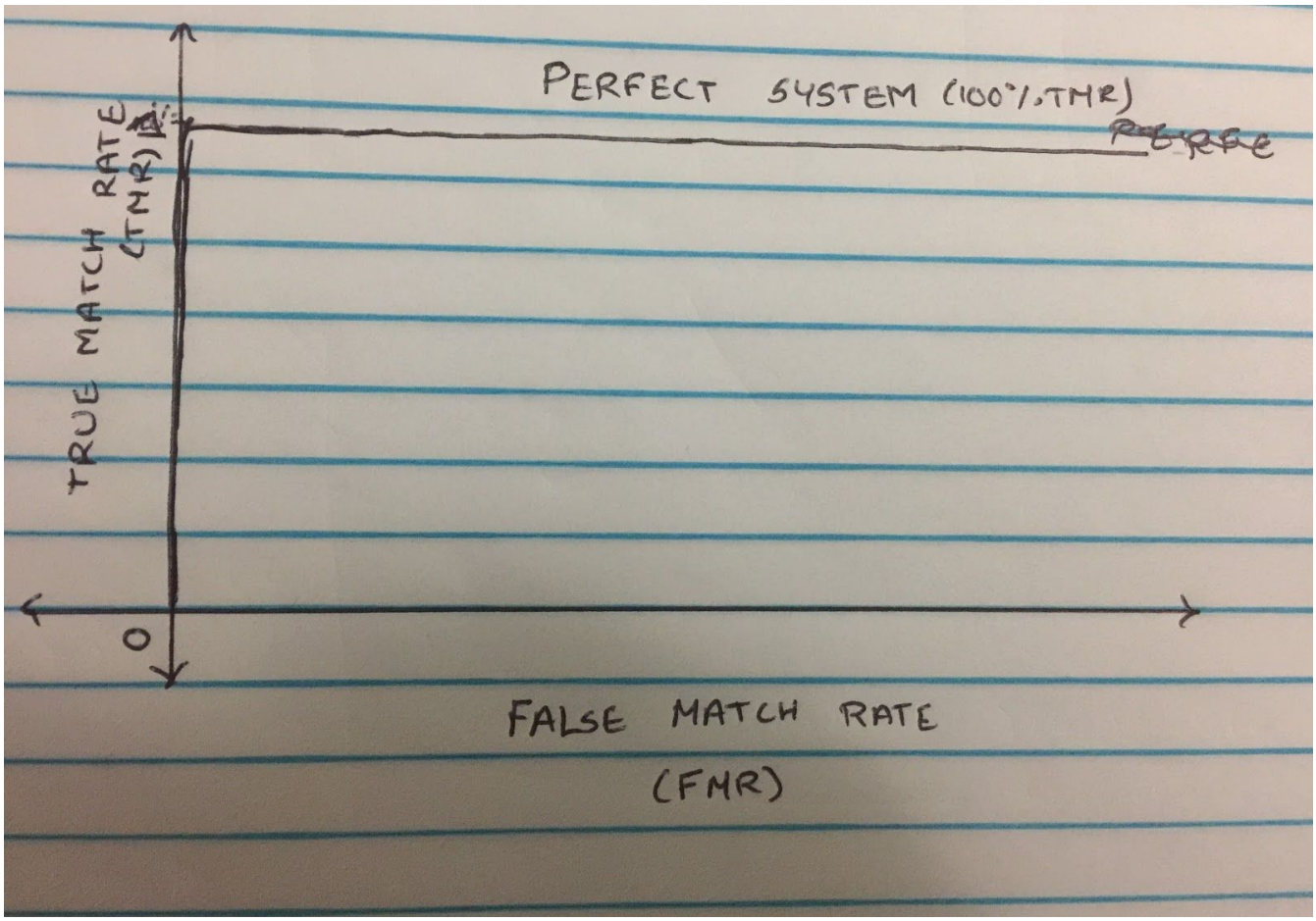


Threshold	FRR	FAR
1	0.8	0
2	0.2	0
3	0	0.05
4	0	0.3

2. Draw ROC curve of a “perfect” biometrics system. “Perfect” means that the system can achieve 100% TMR and 0% FMR.

Answer:

ROC Curve for Perfect System



3. Can we (NOT) estimate recognition error rates from verification error rates? Assuming (1) The recognition system returns all the identities whose match score is above the threshold (2) The same threshold is used for both verification and identification scenarios.
If your answer is yes, how to derive FNR from FRR and FPR from FAR? If you answered no, please explain why? Which is challenging, verification or recognition, why?

Answer:

We can not estimate recognition error rate from verification error rate. As we know, the ROC curve is used in verification system and CMC curve in recognition system. There is a certain correlation between ROC curve and CMC curve. If we try to derive the CMC from ROC curve, there are certain values that are lost during the transition. The challenge is more complex for recognition error rate. In recognition system, inter class variability is possible due to people might have some same characteristics between them which will generate false positive. As ROC is better to understand, verification is easier to use. Another challenge for recognition is we don't know the person, there is a greater chance for failure to enroll. The CMC size is large, so there are a lot of chances for false positive and true negative. These are the challenges for verification system.