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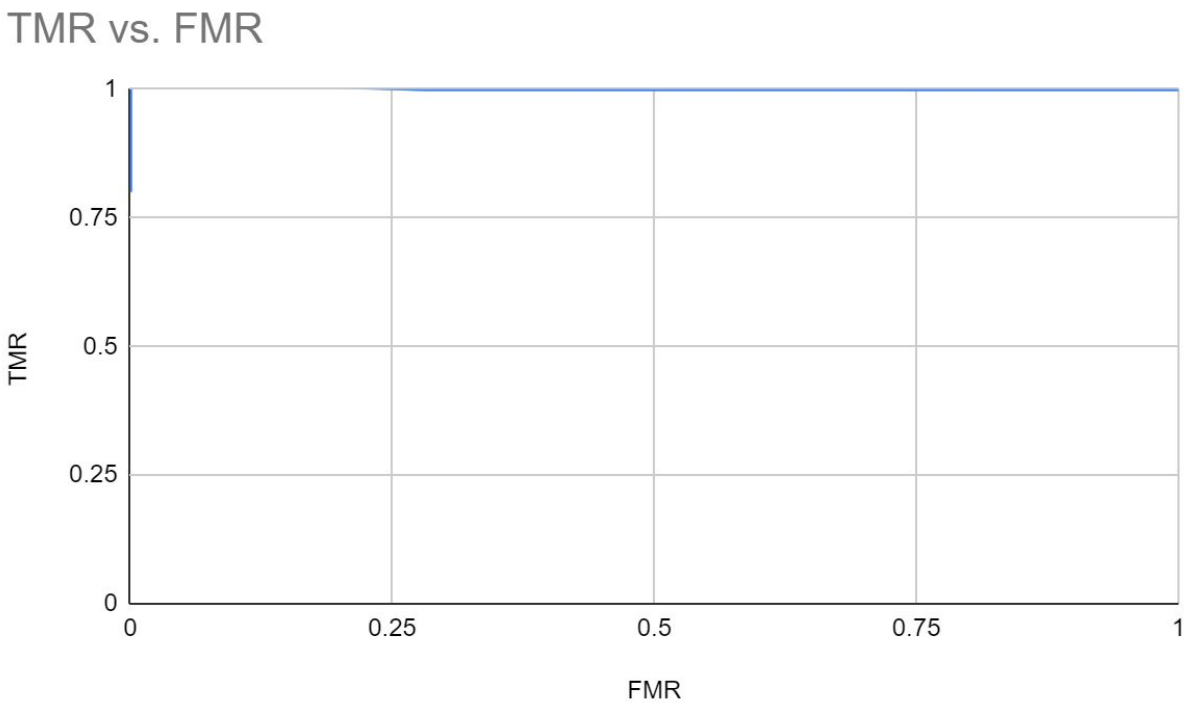
Homework 1

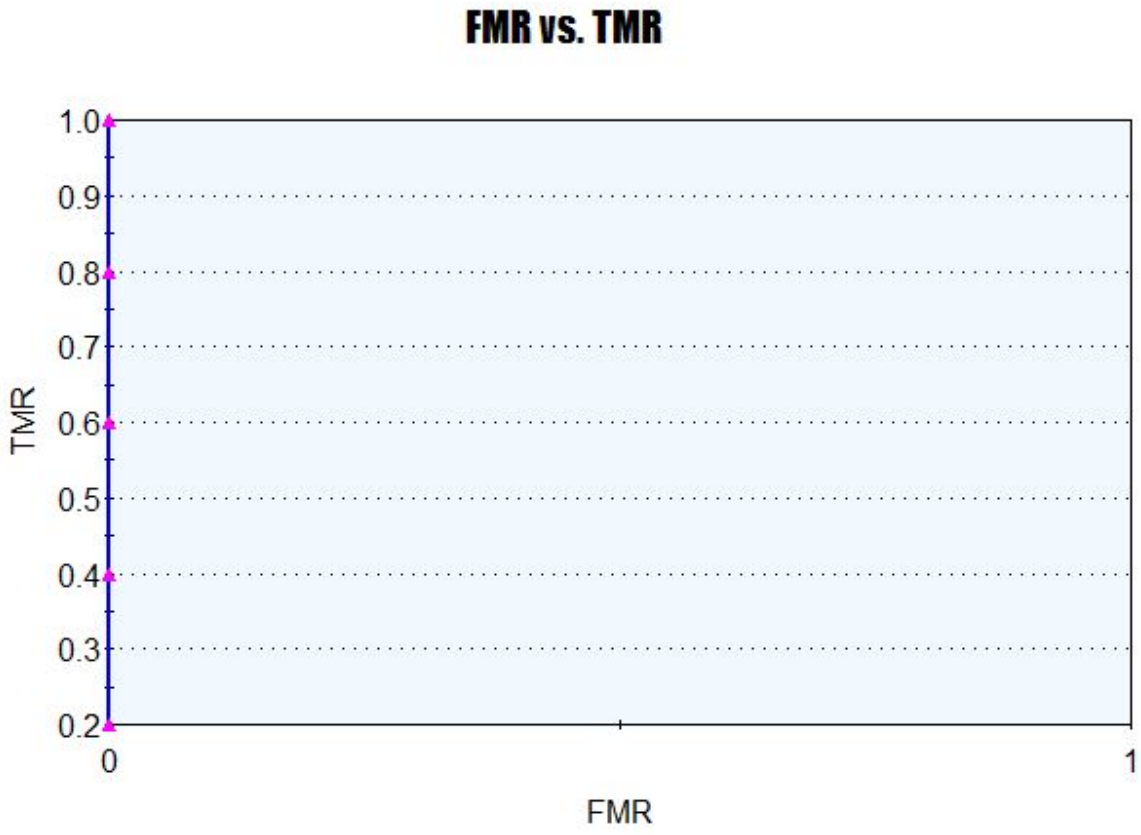
1. The following graph shows the plot of the genuine and imposter distributions.

0.09 is the decision threshhold
TMR = # of aggrements / # of true identity claims = 1 / 5 = 1/5
FMR = # of random Agreement / # of false identity claims = 0/20 = 0
0.1 is the decision threshold
TMR = 4/5
FMR = 0
0.11 is the decision threshold
TMR = 1
FMR = 0
0.49 is the decision threshold
TMR = 1
FMR = 6/20
0.50 is the decision threshold
TMR = 1
FMR = 14/20
0.51 =
TMR = 1
FMR = 19/20



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

A perfect ROC curve would look like a vertical line on the y axis.



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?

.No since verification is a on to one problem and Recognition is 1 to N problem. Recognition can produce many more false positives and false rejects than a verification system. Recognition is more challenging due to the possibility of a claim matching to more than one template enrolled in the system.

4. Please explain the significance of an ROC curve with y-axis as “true match rate” for a verification biometric system if it is a diagonal straight line from bottom left to top right.

The ROC curve is a representation of the imposter and genuine distributions. The closer the imposter and genuine distributions get to each other the closer the ROC curve becomes diagonal. If the curve is completely diagonal then the imposter and genuine

distributions completely overlap and there is no way to distinguish between imposter and genuine.

5. What is the ROC curve for a verification biometric system whose decision is simply flipping a fair coin to accept or reject?

If a fair coin is flipped then there is no real way to determine the difference between imposter and genuine. This means that on the distribution graph the imposters and genuines will be overlapped. When both distributions overlap, then the ROC curve is diagonal from bottom left to top right if the y axis is true match rate.