# Practical 3

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## Feature extraction

1. Describe the feature extraction process in this practical.

   (a) [2 points] What is the purpose of the feature extraction process in this practical?

   **Answer:** Extract the minutiae feature vectors from the image samples in order to create template files containing the minutiae features, which are going to be used for comparison.

   (b) [2 points] What is the input and output for the feature extraction process?

   **Answer:** The inputs are .jpg fingerprint images, and the outputs are the minutiae features of the corresponding fingerprint input as .xyt files containing the minutiae feature information (not necessarily in the listed order):

   i. The absolute position (coordinates x, y)

   ii. The orientation

   iii. Minutiae type

## Reporting

2. From the comparison score you have generated DET curves, which you should attach to this report.

   (a) [3 points] Indicate, which DET curve corresponds to which dataset and protocol (session1-session1, session1-session2)?

   **Answer:** The *DETcurve_s1s1.fig* corresponds to the DET-curve of comparing session 1 with session 1, and we see that all the values are placed along the x- and y-axes. This is because we match a session with itself, which should result in no false matches and no false non matches. The *DETcurve_s1s2.fig* shows a DET-curve with different values depending on the threshold, since we are comparing two different sessions.

   **NB!** The session1-session1 results were generated by changing the *probe_session* value in *To_Do_Comparison.m* from 2 to 1, and then using the resulting *Scores_Protocol1.mat* when running *To_Plot_Det.m*, which I left unchanged.

   (b) [3 points] Which of the two DET curves represents the better biometric performance and why is this the case?

   **Answer:** Assuming that the DET-curve resulting from session 1 matched with itself is correct, then that would represent the best biometric performance, since it evidently has no FMR or FNMR as seen in the placement of the values along the two axes.

## Comment

I have attached two matlab solutions for computing FMR and FNMR. I do believe that *computeRates_v2.m* is the correct way of calculating the values. However, I got a bit confused by the values of the comparison-, genuine-, and impostor-scores as I am more familiar with similarity matrices with values between 0-1. Thus, I normalized the values, and calculated the FMR and FNMR. *computeRates.m* is my first attempt at trying to work with the values greater than the 0-1 range.

Furthermore, I found it a bit difficult to compare my FMR and FNMR results to the graphs as I struggled to see where the values and threshold values "fitted" on the axes. This might be because my results are wrong. Looking forward to an explanation of this task!