Write the steps for biometric system from the beginning of enrollment phase until plotting the ROC curve

enrollment: 1) getting data
2) quality check
3) feature selection/extraction
4) mathmatical vector (transformation)
5) Create template
6) Save Templat in DB

Authentication: 1) getting data
2) feature extraction.
3) mathmatical
4) template from DB
5) Selet distance matrix

6) Calculate d (distance scope)
7) pick threshold
8) d <= t accept = FNMR
   d > t Reject = FMR
9) plot the ROC curve.

d > t Not ok

for a the given table taken from hand geometry Biometric experiment

	A2	B2	C2	D2	E2
A1	0,12	3,74	1,52	3,31	4,31
B1	3,81	0,08	0,97	3,00	3,85
C1	1,53	1,21	0,98	1,22	2,21
D1	3,24	3,00	0,99	0,25	3,45
E1	4,30	3,65	2,45	3,46	0,17

1) Calculate FMR if the threshold is set to 1.22. = 4/20 = 1/5 = 0.2
2) If the FMR is wanted to be zero what is the most appropriate threshold and what is FNMR. Show your work. ↓ Show Range.

1/5

0.97 > x > 0.25 لكل صح

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The steps for a biometric system from enrollment to plotting the ROC curve are:

1. **Enrollment Module**:
   - Template is created and stored in database [1]

2. **Authentication Module**:
   - Biometric data is checked against stored template [1]

3. **Performance Evaluation**:
   - Calculate **False Match Rate (FMR)** [2]
   - Calculate **False Non-Match Rate (FNMR)** (implied from FMR)
   - Consider **Failure to Enroll Rate (FER)** [3]
     - Probability that a person cannot enroll in the system
     - Reasons: Person doesn't have biometric feature or has poor quality feature
     - Trade-off between FMR/FNMR and FER

4. **Plot ROC Curve**:
   - ROC stands for Receiver Operating Characteristic [4]
   - This curve likely plots the relationship between FMR and FNMR

Note: The document doesn't provide explicit details on plotting the ROC curve, but it's typically used to visualize the trade-off between false positive and false negative rates in biometric systems [4].

Write a formula to calculate the FMNR ANF FMRV

# of impostertrial , # of genuine , # rejeated gemine , # Accepled
FMR   imposter
                                                      ↓
                                                    FMR

$$FMNR = \frac{\text{\# rejected gemine}}{\text{\# geniure trials}}$$

$$FMR = \frac{\text{\# of impostrial Accepted.}}{\text{\# of imposter trials.}}$$

Pick a biometric system and identify level HIGH MEDUIM LOW , of each characteristic
universality— circumvention with justification

Retnial Scan   Face   Fingerprint

- Universality   high   high   high
- Distinctiveness high   medium (in twins)   high
- Permanence   medium   high - medium   meduim. (suratch)
- Collectability high   high   high
- Performance   high   medium   high
- Acceptability   medium   high   high
- Circumvention   Low   high - medim   Low.

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