Fingerprint Recognition

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Abstract

Fingerprint recognition has been implemented for 10 subjects. Digital persona SDK has been used for extracting features and matching with template.

1. Database details

Each subject has 50 finger prints. Each finger has 5 different orientation captured. In total, we have 500 images of fingers.

- Test data: We randomly choose 5 finger prints for each subject making test data size as 50. We are labeling each finger image with the subject ID.
- Template Data: Rest all 450 images are used to find the match.

We are recognizing the subject and not the specific finger in this case. We used different threshold levels to find True Positive and False Positive count. This threshold value is the percentage value of the maximum score value that SDK can return.

2. Program details

We have used Java Development Kit 1.7 version for development. "dpuareu.jar" needs to be added in java referenced libraries.

- File name: FingerPrintVerificationUareU.java

Idea is to compare FMD and calculate match score. Score ranges from 0 to 2^{31} i.e. 0 to 2147483647; where 0 is for perfect match. In our experiment, we have used different threshold values depending upon the fraction of this maximum score. As shown in table 1 "True Positve" (TP) and "False Positive" (FP) counts generated for different threshold percentage values. e.g. 1% of 2^{31} was set for third iteration of testing.

Threshold percentage	TP	FP
0.05	39	1
0.2	42	6
0.5	42	13
1	43	27
5	47	144

TABLE 1. RESULT DATA

Threshold value has been decreased from 5% to 0.05% to lower the False Positive Rate.

2.1. Code Configuration

Following changes need to be done.

- Variable "students": Is a string array containing names of all subjects/lables so that FMD (Fingerprint Minutiae Data) list can be created per subject.
- Variable "dir": Is the directory path for dataset.

For running test data, instruction has been added in the source file.

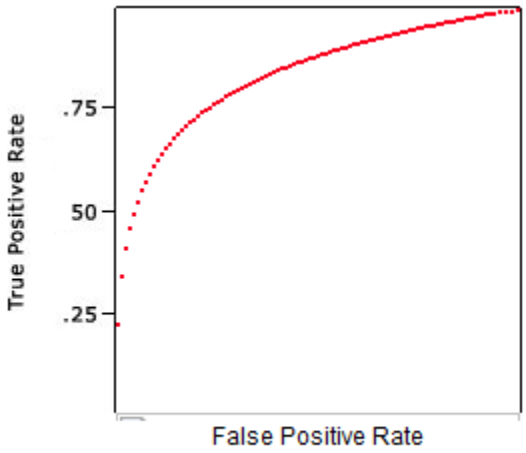

Figure 1. ROC Curve

3. Result

Figure 1 is the ROC curve for algorithm developed. This is with reference to the table 1 on the previous page.

4. Remark

It is observed that as threshold value has been decreased, false positive value decreased with large margin but true positive count did not decrease much. When threshold value is set to 0, TP and FP count were zero as expected because we did not compare FMD of test data with itself. As test data and template data are distinct, there is no perfect match.