**Feature level Fusion of Palm print and Palm vein**

**Description:**

Biometric systems have become a major part of research due its application of identification. Code provides a multimodal biometric system using palm prints modality combined with palm print modality. DCT transformation is applied initially into input image. The proposed methodology uses standard deviation of pre-defined block of DCT coefficient as feature vector. In this way single image is converted into feature vector of 1 x 39. Recognition process is being done by performing distance measurement between feature vector of testing and training data set. Results show that the False Acceptance Rate (FAR) of feature level fusion is less than that of uni-modal systems, hence having multimodality is advantageous. Testing and training is done on database of 500 students of College of Engineering Pune, Pune, India. Canberra distance shows best result when compared to Euclidean or Manhatten distance.

**How to Use:**

The source folder contains 5 m-files:

1. **palmvien\_training.m:** This program performs feature level extraction of palm vein of 500 students (4 images each). The image is converted into feature vector of 1 x 39. This program is used to create training sets. Feature is stored in text file name features\_palmvien\_1000.txt.
2. **palmvien\_testing.m:** This program performs feature level extraction of palm vein of 500 students (2 images each). The image is converted into feature vector of 1 x 39. This program is used to create training sets. Feature is stored in text file name features\_palmvien\_1000\_test.txt.
3. **Palmprint\_Training.m:** This program performs feature level extraction of palm vein of 500 students (4 images each). The image is converted into feature vector of 1 x 39. This program is used to create training sets. Feature is stored in text file name features\_palmprint\_1000.txt.
4. **Palmprint\_testing.m:** This program performs feature level extraction of palm vein of 500 students (2 images each). The image is converted into feature vector of 1 x 39. This program is used to create training sets. Feature is stored in text file name features\_palmprint\_1000\_test.txt.
5. **palm\_print\_vien\_fu.m:** This program performs feature level fusion of palm print and palm vein. Feature vector of palm print and palm vein is fussed for training and testing sets. Comparison is performed using Canberra distance, Euclidean distance.

**Note:** The user can directly run the m-file ” **palm\_print\_vien\_fu.m**” as file containing training and testing feature vector of palm print and palm vein is already stored in source code folder. But in program address need to be change.

**Output:** The output of program tells the results of template matching performed on training and testing data sets. The output is stored in variable ‘win\_img\_i(k)’. In this variable image no. of training data set is stored, which matches closely with image on ‘k’ of testing datasets. For ex: image no. of testing sets 1, 2 (template-1) should match with image no. 1-4 (template-1) of training datasets. Likewise for image no. 4, 3 (template-2) or win\_img\_i(3,4) it should store no. between 5-8, which corresponds to template-2 in training datasets.

**Conclusion:** The system is having FAR, FRR and GAR of 0.2% , 0.2% and 99.8% respectively.Canberra distance shows best result when compared to Euclidean or Manhatten distance.