pointing out such a coordinate system are as follows.

Step 1: Determine X-axis of the synchronize system. The bottom limit of the finger effortlessly is extracted by edge detector. Really, this bottom boundary is approximately reliable to all FKP images because all the fingers are position totally on the blocks in information acquirement. By appropriate this limit as a straight line; the X-axis of the confined synchronize system is determined.

Step 2: Crop a sub-image of IS and the left and right borders of IS are two fixed values evaluate empirically. The top and bottom borders are estimated according to the boundary of real fingers and they get hold of by edge detector.

Step 3: Edge detection applied to obtain the edge map IE.

Step 4: Convex direction coding for IE describe a perfect model for FKP “curves”. In FKP extraction using SIQT and SSF model, an FKP curve is either convex leftward or convex rightward. The pixels on rounded leftward curves as “1”, pixels on rounded rightward curves as “-1”, and the other pixels not on any curves as “0”

Step 5: Determine the Y-axis of the coordinate system. For an FKP image, curves on the left part of are mainly convex leftward and those on the right part are chiefly rounded rightward. Meanwhile, “curves” in a small area around the joint do not have obvious convex directions. Based on this inspection, at a horizontal position x (x represents the column) of an FKP image.

4. Experimental Evaluations

The proposed FKP for hand geometry and palm print using SIQT and SSF features is implemented by using Java platform. The experiments were run on an Intel P-IV machine with 2 GB memory and 3 GHz dual processor CPU. The experiments are carried over with sets of sample images. In order to estimate the performance of the proposed FKP for hand geometry and palm print, the proposed features are applied to those sample sets of images with SIQT and SSF approaches. Based on Scale Invariant Quality Transform (SIQT) and the Strong Speeded up Features (SSF), the texture values are generated and features are efficiently extracted in a secure manner.

After that, it would match the template values and proficiently identify the given image similarity. The proposed FKP for hand geometry and palm print is efficiently designed for identifying the similarity of image (hand geometry/palm print) and improved the multimodal biometric security using SIQT and SSF features. The performance of the proposed FKP for hand geometry and palm print in multimodal biometric security using SIQT and SSF is measured in terms of

i) Feature Extraction rate
ii) Matching
iii) Error rate

5. Results

The experiments are evaluated on how the palm print/hand geometry image similarity are identified by extracting the features using the proposed FKP for hand geometry and palm print in multimodal biometric security with SIQT and SSF features and contrast with an existing TCIB approach written in mainstream languages such as Java. A set of sample test images are used with diverse postures to estimate proposed FKP using SIQT and SSF. The comparison results shown that proposed FKP for multimodal biometric security using SIQT and SSF outperforms well. The below table and graph describes the process of the FKP for hand geometry and palm print in multimodal biometric security with SIQT and SSF features.

5.1 Feature Extraction Rate

It is defined as the special form of dimensionality reduction in biometric system. Transforming the input data into the set of features is called feature extraction. It is measured in terms of percentage (%).

The table (Table 1) describes the process of extraction of features in the given sample set of images. The results of FKP for multimodal biometric security using SIQT and SSF are compared with an existing TCIB approach.

No. of users	Feature Extraction rate (%)	
	Proposed FKP technique	Existing TCIB
1	12	9
2	28	18
3	35	27
4	48	34
5	56	40

Table 1 No. of users vs. Feature Extraction Rate

Fig 6 shows the process of feature extraction from the given set of images and the results are compared with an existing TCIB and proposed FKP using SIQT and SSF features for hand geometry/palm print features. In order to reveal effectiveness of the proposed FKP using SIQT and SSF features for knuckle feature extraction print matching concepts, have plotted the number of user and feature extraction process in terms of rate.

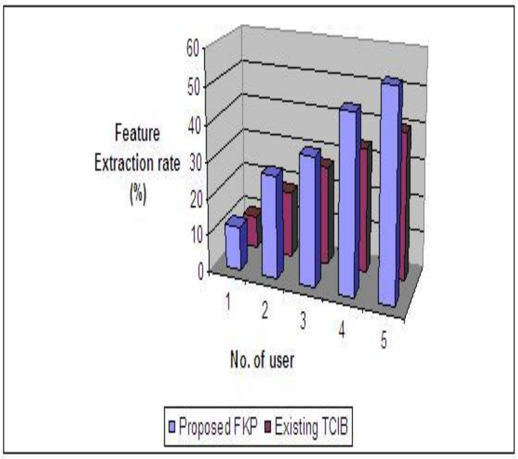

Fig.6 No. of user vs. Feature Extraction rate

The general matching graphs for proposed FKP for multimodal biometric security using SIQT and SSF is plotted for number of user versus matching (%) for different users. It is practical from the graph that matching (%) obtained for the proposed FKP for multimodal biometric security using SIQT and SSF are coordinated with the analogous features which is 20 – 30 % higher when compared to existing TCIB approach.

5.2 Matching

It is defined as the rate of matching the input biometric finger knuckle palm print with the stored database information. It is measured in terms of percentage (%).

No. of users	Matching (%)	
	Proposed FKP technique	Existing TCIB
1	16	12
2	30	20
3	42	32
4	50	40
5	62	51

Table 2 No. of user vs. Matching

The above table (Table 2) describes the process of matching factor of the given sample set of images. The results of FKP for multimodal biometric security using SIQT and SSF are compared with an existing TCIB approach.

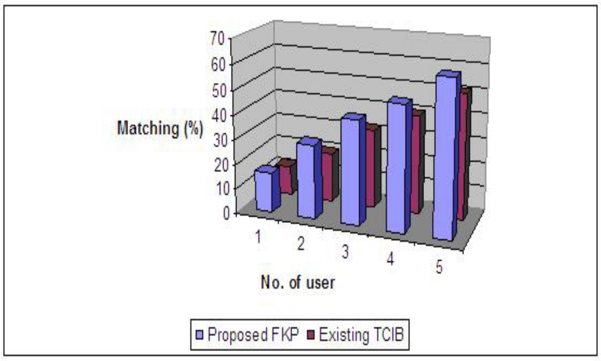

Fig.7 No. of user vs. Matching

Fig 7 shows the performance of general matching work done for the existing TCIB and proposed FKP for multimodal biometric security using SIQT and SSF. In order to exhibit effectiveness of proposed work FKP for multimodal biometric security using SIQT and SSF. It plots the number of user and matching in terms of rate. The general matching curve for the proposed FKP for multimodal biometric security using SIQT and SSF is plotted for number of user versus matching (%) for different users. It is known from the graph that matching (%) obtained for the proposed FKP probable coarse reflection in SSF is 10 – 20 % prolonged higher when compared to existing TCIB approach.

5.3 Error rate

Error rate is the term which defines the amount of error (i.e.) the biometric mismatches. The error rate is measured in terms of percentage (%).

No. of users	Error rate (%)	
	Proposed FKP technique	Existing TCIB
1	2.3	5.8
2	4.6	9.3
3	6.2	8.6
4	5.4	12.5
5	6.9	15.4

Table 3 No. of users vs. Error rate

The above table (Table 3) describes the error rate occurred during the feature extraction process. The results of FKP for multimodal biometric security using SIQT and SSF are compared with an existing TCIB approach.

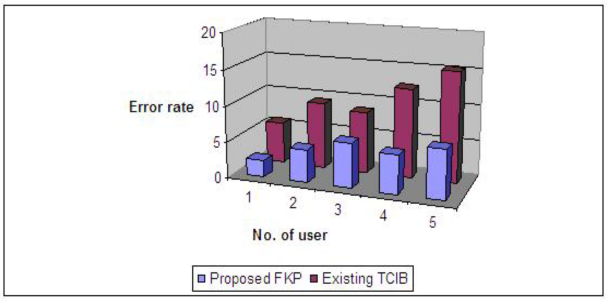

Fig. 8 No. of user vs. Error rate

Fig 8 shows error rate occur during the proposed FKP for multimodal biometric security using SIQT and SSF. Since the SIQT has been used for improving the features of identifying the knuckle feature extraction process, the feature extraction is done efficiently with low error rate. To improve the performance of the proposed FKP for multimodal biometric security using SIQT and SSF, the error rate has been found.

The general Error rate curve for the proposed FKP for multimodal biometric security using SIQT and SSF is plotted for number of user versus error (%) for different users. From the graph, it is identified that the error rate is 40 – 50 % reduced in proposed FKP, which uses $W_T = C_T / (C_T + C_S)$ for multimodal biometric security when compared to existing TCIB approach.

At last, it is concluded that the proposed FKP for multimodal biometric security using SIQT and SSF is efficiently designed and the knuckle features are extracted in a reliable manner with less error rate. After the features are extracted from the knuckle fingerprint, the matching has been done with the training set of images.

6. Conclusion

A FKP approach efficiently extracts the features from knuckle finger print pose invariant biometric identification using Palm print and hand geometry images. FKP is acquired through a combined value imaging set up. The proposed FKP approach used the required hand images to guess the track of the hand. The estimated direction information of the given image is then developed to correct pose of the obtained 3-D as well as 2-D hand. FKP also developed a SIQT and SSF features for proficiently extracted hand features together for palm print matching features. The proposed FKP for multimodal biometric security using SIQT and SSF efficiently matched scores with an existing TCIB feature sets. The experimental results demonstrated that the proposed FKP for multimodal biometric security using SIQT and SSF approach significantly better in terms of the feature extraction process. The results also showed that the FKP for multimodal biometric security using SIQT and SSF constantly outperforms in terms of feature extraction and matching factor with less rate.

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