

## **Chapter-7**

### CONCLUSIONS AND FUTURE SCOPE

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## CHAPTER 7

### CONCLUSIONS AND FUTURE SCOPE

#### 7.1 CONCLUSIONS

The present thesis addressed the problems in deriving efficient and precise texture feature for an accurate classification. For this the present thesis derived various innovative methods for image classification and recognition based on Shape Features Derived from Structural approaches. The present investigation on various textural and facial images derived complex and simple shapes for effective and accurate age, texture classification. For this the present thesis derived a new technique of adulthood classification by extracting “Complex Geometric shape features on Integrated Texton based LBP” (CGSF-ITLBP), a “Texture Orientation Fuzzy Texton Binary Matrix (TOFTBM)” for an effective texture classification, a fuzzy based Image Dimensionality Reduction using shape Primitives (FIDRSP) model for an efficient face recognition, exploited Texture Shape Features (TSF) on the FIDRSP model of the facial skin for an effective age classification, and derived Integrated LDP with OR operation on Textons (ILDLP-T) for an effective texture classification.

At the end of each chapter a brief summary is given. The salient features of the above proposed methods are:

- The proposed methods overcome the disadvantages of LBP.

- The proposed CGSF-ITLBP model classified accurately the facial images into two groups.
- The proposed FTOFTBM overcame the sensitive problems in formation of Textons on LBP units.
- The proposed TOFTBM Precisely represented the spatial correlation of color and texture orientation.
- The TOFTBM integrated the advantages of Shape features and histogram by representing them on Texture Orientation. This makes the proposed method as rotationally invariant.
- The proposed FIDRSP model addressed the problem involved in extracting the features on the entire image and on the large grey level range of the image, by reducing the overall image and also reducing the overall grey level range.
- The proposed Image FIDRSP model reduced the overall dimensionality of the image into  $(2N/3 * 2M/3)$ , while preserving the significant attributes, local properties and local edge information.
- The present thesis extended FIDRSP model using Texture Shape Features (TSF) and developed an innovative technique that classifies human age into five different groups i.e. 0 to 12, 13 to 25, 26 to 45, 46 to 60 and above 60 only by experimenting on only forehead and chin parts of the facial image. This reduced further complexity.

- In TSF on FIDRSP TSF's are derived only on fuzzy grey level value 2. And no TSF is generated on the other fuzzy grey level value.
- Further the present thesis explored another method to reduce the dimensionality using shape primitives on Integrated Local Directional Pattern with OR operation on Textons (SP-ILDP-T) for efficient texture classification.

All the proposed methods are compared with the similar methods, The results, tables and graphs clearly indicates the potentiality, accuracy of the proposed texture classification methods based on shape features derived from structural approaches over the other existing methods. The experimental results of the thesis, clearly indicates that the derived methods of the present thesis give a new direction and enthusiasm for future researchers in the field of texture classification, recognition and analysis.

## **7.2 COMPARISON OF PROPOSED METHODS**

The present thesis mainly concentrated on different stone texture classification and age classification. The stone textures are collected from five different databases. The proposed stone texture classification results based on TOFTBM method of chapter 3 and SP on ILDP-T method of chapter 6 are compared and the classification results are listed in table 6.5 of chapter 6. The proposed SP on ILDP-T method shows high classification rate of stone textures for all the databases than proposed

TOFTBM method. This is due to the fact of utilization of effective shape features on Integrated LDP using OR operator on textons in the proposed SP on ILDP-T method. The present thesis evaluated edges responses in all eight directions for the derivation of LDP. These are derived at each pixel location of LBP. This process of LDP generated relative strength magnitude which is more stable than pixel intensity. That's why the proposed SP on ILDP-T has overcome the disadvantages of noise and illumination changes. The shape features are derived from morphology. Morphology represents shape and topology in an efficient manner. That's why SP on ILDP-T method is more effective than other proposed TOFTBM method. Further TOFTBM method integrated Sobel and Canny edge operator which might have led some improper edges. Although the method TOFTBM has shown classification rate of above 90%, it is an average 3 to 4% less classification rate than the proposed SP on ILDP-T method.

The comparison of classification results on age by the two proposed methods TSF on FIDRSP of chapter 5 and Shape features on ITLBP of chapter 2 are listed in table 5.6 of chapter 5. The method TSF on FIDRSP of chapter 5 classified the age into five groups and achieved an average classification result of 96%. The second proposed method of chapter 2 classified the human age as child and adulthood and attained a classification result of 95%. The reason for this is Texture shape features

like curves U, V and T patterns have great influence in age classification than ordinary shape features of IT-LBP method.

### **7.3 FUTURE SCOPE**

A number of potential improvements and extensions can be done in the future pertaining to the proposed approaches for texture classification using shape features derived by integrating both structural and statistical approaches. All the proposed algorithms of the present research are exercised without wavelets; it could also be exercised with wavelets, so that further level of compression or reduction in texture classification can be achieved. The other complex patterns can also be studied for an effective classification.