CHAPTER 6

CONCLUSION AND SCOPE FOR FUTURE WORK

6.1 CONCLUSION

The main intension of this research is the development of reliable recognition based on iris images captured, without requiring the subject’s cooperation and under heterogeneous lighting conditions in an uncontrolled environment. The dynamics of the imaging environments lead to the appearance of highly heterogeneous images with the iris information corrupted by several types of noise such as eyelashes and eyelids, pupil dilation and image rotation due to head tilt and camera rotation. These images significantly increase the difficulty of performing reliable recognition, which is a problem identified by several authors.

This thesis constitutes a step-ahead towards the iris recognition in an uncontrolled environment.

A method has been proposed to perform the iris classification based on several independent iris sub-images. The proposed subimage formation method divides the iris into separate regions, which contributes for a substantial decrease of the error rates in the recognition of noisy iris images. The noise regions of the captured irises are localized in some subpart of the iris region. The proposed subimage method divides the normalized iris image into eight different regions and performed independent feature extraction and comparison on each region.
Starting from the normalized images, in order to increase their robustness to eyelashes, eyelid occlusion and image rotation, I have described a method to measure the quality of the extracted iris regions and use this value in the fusion of the similarity between iris features. Lower quality values correspond to features that were extracted from typical noise regions, and it is probable that the resultant feature value is corrupted and with small discriminating capacity. The proposed quality measure gives the proportion of information considered in the subimage in the computation of the similarity between iris images. The final classification is achieved through a fusion rule, which is based on the quality of each subimage.

The proposed method reduces the number of regions affected by various types of noise such as eyelashes and eyelids and achieves higher recognition rate compared with other filter bank methods such as wavelet and Gabor filter method. Re-iterating the pyramid can increase the number of levels. Furthermore, increasing the number of DFB levels can increase the directional selectivity.

The proposed undecimated pyramid provides the bandpass image to the DFB. The undecimated band pass image provides sufficient information for further processing.

Optimal projection analysis reduces the redundancy within image rows and columns and represents rotation invariant features, which reduces the memory space required for storing the multiple template features and achieves higher recognition rates on rotated and non-rotated images.

The capability of the proposed method enables the biometric systems to deal with noisy and blurred captured images for identification of the subjects where a cooperative behavior is not expected. Experimental
results on the UBIRIS database indicate superior performance of the proposed method in comparison with the most of the existing methods. The performance of the proposed approach in dealing with low quality captured images makes it a reliable approach towards noncooperative iris recognition.

6.2 SUMMARY AND SCOPE

In this chapter, I have described the importance of the proposed algorithm in iris recognition using the images captured in the uncontrolled environment. The classification rate of the proposed algorithm have been compared the other proposals suitable for images captured in the uncontrolled environment as in chapter 5 and found that the proposed method has achieved good results.

Some feature directions in this research are provided below. Various types of noise considered in this work are eyelash, eyelid occlusion, lighting reflections and rotational effect. There may be a possibility of off-angle iris images due to noncooperative environment. This also increases the false rejection rate of the iris recognition system. Therefore the subject of further work is with off-angle iris images. This will obviously introduce new challenges to the recognition that must be overcome, and demand the adjustment of the proposed method.

Instead of using distance classifier, some of the soft computing tools such as neural network may also be employed in order to improve the performance of the system.