CHAPTER – 5

SUMMARY AND FUTURE SCOPE OF RESEARCH

5.1 Summary

The following can be summarized from the proposed method of automatic periodicity extraction:

(i) There is no need for preprocessing such as denoising of the input image.

(ii) There is no need for post-processing such as blurring and thresholding unlike Fourier transform and autocorrelation based methods.

(iii) The proposed method seeks for overall maximum in the second forward difference of overall row-DMF (or column DMF) for the extraction of row periodicity (or column periodicity) and hence the periodicity extraction is automatic unlike Renyi’s entropy method and co-occurrence matrix based methods ($\psi^2$-statistics, $\kappa$-statistics and inertia) that involve manual extraction of location of deep valleys or local minima for periodicity extraction.

(iv) Periodicity extraction in row direction is independent to that in column direction and hence the proposed method can be used for extracting periodicity in textures containing rectangular periodic blocks unlike Renyi’s entropy method that can be used for manually extracting only square shaped periodic blocks.

(v) The proposed method can be used for automatically detecting periodicity in textures belonging to 17 wallpaper groups.

The following can be summarized from the proposed defect detection methods based on experimentation on defective fabric images:

(i) There is no preprocessing or post-processing involved in the defect detection methods.

(ii) The methods work on the basis on unsupervised technique using hierarchical clustering without any training stage for obtaining threshold or decision-boundaries.
(iii) The concept of extracting four cropped images and analyzing the periodic blocks for defects is introduced. As a result, there is no need for extracting lattices or motifs manually from the test image for finding the defects. Moreover, defects not identified in one cropped image will be identified in any of the other cropped images.

(iv) Computational time of all our defect detection methods is less than that of other methods available in literature.

(v) In the absence of false positive, fusion of defects identified from four cropped images generated from the input image helps in getting an overview of the total defects.

(vi) On an average, overall accuracy for HVP contrast based method is slightly better than that of Gabor wavelet based method and other three non-HVP based methods. This reveals that HVP based contrast can replace human vision based defect detection. This method can be further extended and can be thought of implementation in automated inspection scheme.

5.2 Future scope of research

Since the proposed method of periodicity extraction is generic and it can be applied over all 17 wallpaper groups, the proposed method of periodicity extraction can be thought of implementation in automated inspection of products involving repeating patterns. In industries such as fabric industries, this will first save huge manpower requirement and human intervention for periodicity extraction from the fabric textures as automatic periodicity extraction is the first step in our defect detection scheme. Next comes the defect detection part. Though both HVP based and non-HVP based methods are developed, one has to find an appropriate choice of the method as it is found that the success rate is dependent on so many factors such as illumination/ lighting for the image under inspection, the type of defect and the type of wallpaper group. Based on experimental analysis on several fabric images with defects, we can come to the conclusion that the defect detection method based on HVP contrast can be a good choice for future implementation of the method in fabric inspection system. It has the second least computational time.