CHAPTER 6

DISCUSSION AND CONCLUSION

6.1 GENERAL DISCUSSION

Though a number of methods are available for colour image retrieval systems using low-level and high-level image features, each method is concerned with a specific type of process either at low-level or high-level, and also complicated. The proposed system is invariant for rotation, scaling, and noise, since the query image is treated as a sample or population of the target image and vice-versa. But, at the same time, it is simple and efficient. The research work carried out in this thesis is aimed to obtain a common framework for colour image retrieval, based on the Bivariate and Multivariate statistical tests of hypotheses, orthogonality tests.

6.2 ADVANTAGES OF THE PROPOSED SCHEME

In the earlier works [Theo05], the block-wise sampling / segmentation technique is used. The block-wise sampling / segmentation technique does not give good results for the same image with transformed one. The corresponding blocks of query (actual) and target (transformed) images are not spatially matching, if the target image is transformed. So the earlier techniques fail to locate and retrieve the correct images. This problem is overcome in the proposed technique, since the query image or the target image is treated as a sample of one another. Since the proposed system uses the global distributional (query and target images) differences, it overcomes the existing drawbacks in the earlier systems. Also, the computational complexity is reduced considerably by adopting the multivariate tests of hypothesis.
If \( \text{CD}(P_q, P_t) \leq 1 - \alpha \), at the level of significance \( \alpha = \Sigma \sqrt{P_q, P_t} \), then it is inferred that the query and target images are same or similar; otherwise, the two images differ. Based on the outcome of the inference, the matched images (same or similar) are marked and indexed in ascending order, and the indexed images are retrieved. The significance level, \( \alpha \), is fixed after conducting a rigorous experiment with various types of images, such as texture (both stochastic and periodic) and untexture or structure.

The proposed method, based on the CD measure, has three main advantages:

(i) It adapts itself to all types of images, i.e. the images follow either Gaussian or mixed or non-Gaussian process because *a priori* probabilities, \( P_q \) and \( P_t \), of the query and target images play a noteworthy role in measuring the distance between them; The \( P_q \) and \( P_t \) are computed, based on the query and target images, they are not fixed to 1/2 as in BD.

(ii) In the case of BD, the *a priori* probabilities, \( P_q \) and \( P_t \), of the query and target images are fixed to 1/2, which is optimal; so they must adhere to the Gaussian properties.

In the case of image retrieval, the *a priori* probability of the query image which matches with the target image is fixed to 1/2. It is biased because the image may or may not adhere to the Gaussian properties. In the case of fully automated image retrieval system, it is difficult to understand the nature or structure of an image without analysis; and it is not fair to fix the *a priori* probability of \( P_q \) to 1/2. Thus, the BD is not appropriate for all types of images; so it does not lead to a better result.
In the case of CD, the *a priori* probability of $P_q$ is estimated according to the nature of the query image. So the proposed method works well for any type of images, even though they are distributed to either Gaussian or mixed or non-Gaussian random process or even if it is distribution free. Thus, the proposed method leads to better results than those of the existing methods.

### 6.3 SCOPE OF THE FUTURE WORK

There are many interesting topics in computer applications, such as image processing, computer vision, pattern recognition, data mining, etc. which need further research work. The proposed common framework based on the statistical tests of hypotheses and orthogonality test can be utilised to fulfil the current requirements.

The proposed common framework can be effectively utilised for extraction of features in managerial data, and retrieval of information for quick decision making. The proposed method can also be applied in the field of agricultural, medicine for extracting the features, and searching the information. It can also be extended for the multi-spectral satellite image retrieval.