CHAPTER 8

Conclusion and Future Scope of Our Work

In the ever-expanding digital image environment, tampering of digital image poses a serious threat especially in legal, commercial and scientific research area. A humble effort has been made by us to provide efficient tampering detection algorithms using image feature based hash generation technique. Few methods were attempted and tested against the required properties of hash functions through experiments on large image data base. Relative merits of all the technique have been discussed in respective chapters.

Firstly, correlation coefficient was used to extract image features and was used to calculate the hash values. Certain mathematical tools such as hash matrix, hash vector and similarity value were used to carry out tampering detection, localization along with quantitative measurement of amount of tampering. Robustness and sensitivity was also proved experimentally. Second method based on Singular Value Decomposition of image matrix was used to achieve very high degree of security of hash function. Collision probability test was carried out over a very large data set and it was found to be extremely low and thus proving the high quality of chosen hash function.

Next step was to look for tampering detection algorithm which was highly sensitive but also equally robust against content preserving manipulations. Canny Edge Detector was used as feature extractor and hash values were generated by defining a new function called Average Edge Index which is based on edge content of the image. High degree of sensitivity and robustness was achieved though
with a slightly high collision probability (but still very low) as compared to SVD method.

In the last method, we defined a multiple parameters hash value using a new index called Comprehensive Image Index (CII). This method can detect multiple tampering operations in the image simultaneously. The multiple parameters were structure, brightness and contrast. CII is able to give idea about the motive of the attacker and very useful for forensic laboratories. This technique satisfied various requirements of good hash function.

This work is being continued using different techniques for different objectives. Haar wavelet transform based image hashing is being worked out which will be helpful in detecting tampering in medical images and machine design. Further work may be pursued to use compressive sensing technique for feature based hash generation. Area of work can be expanded to blind techniques which together with our work can prove to be very useful for forensic science laboratories.