SUMMARY AND CONCLUSION
CHAPTER 5
SUMMARY AND CONCLUSION

A great deal of effort has been focused on the investigation of automatic signatures verification and interpretation system. A reliable automatic verification and interpretation system would be of great use in many application areas including law enforcement, security control, forensic department, share market, banks, etc. Generally it can be done in two ways: offline and on-line. The two methods differ in the form in which the input data are captured. Because it is difficult to extract individual features from static images or to detect imitations, offline signature verification and interpretation is usually more difficult than the on-line equivalent. Hence, there is a demand for offline systems because of its efficiency and accuracy.

5.1 SUMMARY

Offline signature verification and interpretations is an important part of many business processes. It can be used in many applications like cheques, certificates, contracts, historical documents etc. Since organizations may have a huge amount of signatures, a method is required to allow efficient recognition and verification with rate of correctness.

The SVAIS was developed with the main objective of developing an automatic computerized offline signature verification system, which not only
identifies forgery and genuine signatures, but also interprets them. Further, the system also had features for improving the quality of the signature scanned using several preprocessing techniques. Further, the system developed also interpreted the comparison result between the specimen and database signatures. Fuzzy logic was introduced in all the pre-processing steps to improve the accuracy of the signatures image automatically. For the comparison process, boundary detector, segment divider and stroke comparator were utilized.

Hamming distance algorithm is used in the stroke comparison process. The success rate of segment comparator is calculated by using 2 threshold values. A pre-defined threshold value (Half the size of the segment size) is used to compare the number of counts, thus deciding whether to accept the segment as matched or not. The second threshold is a user defined threshold and if the segment match counter value exceed this user defined threshold, then the signature is accepted or else it is rejected. Signature verification results are based on a set of 100 signatures for 2 persons. The verification rates are controlled by a user defined threshold parameters percentage that serves to achieve a balance among accepted and rejected signatures. Based on this (False Rejection Rate) (FRR) for genuine signatures and FAR (False Acceptance Rate) for the forged signatures are identified. The implemented system also provides a good trade-off between short response time and reasonable correct verification results (95% for genuine signatures; 90% for forged signatures). The system also interprets the result in the
form of stroke variation or difference in the pen thickness, the picture format, picture dimension, picture colour depth and picture surface area. In addition to this the overall performance of the signature verification and interpretation system is efficient when compared with existing techniques.

5.2 CONCLUSION

In this dissertation, a novel approach has been used to study the performance of signature verification and interpretation system using fuzzy preprocessing techniques, hamming distance algorithm and segmentation. Comparison of signatures gave the result in the form of interpretation with almost 95% accuracy for the genuine signatures 90% accuracy for the forgery signatures in minimum time (i.e, Milliseconds).

- The signature obtained can be improvised by using filters, sharpening tools, given in the pre-processing module.
- Fuzzy logic is used for all the pre-processing methods to improve the accuracy of the signature image.
- Hamming distance is used to compare strokes in the specimen and data base signatures to simplify the comparison process to make the system simple.
• The system interprets the result in the form of stroke variation or pen thickness difference, difference in the picture dimension, difference in the picture colour depth and difference in the surface area.

• The system identifies the False Rejection Rate (FRR) for the genuine signatures and False Acceptance Rate (FAR) for the forged signatures.

• In general, a stroke is defined as a continuous draw between the pen fall and pen rise. In this sense, a stroke is treated as a list of line segments with different gradients (Chiu and Tseng, 1999).

The signature verification and recognition algorithm could be made more robust by adding more global descriptors of the signatures that could allow the system to discard coarse forgeries (Leclerc and Plamondon, 1994) However, signature verification has the additional disadvantage that a forger with enough information about the true signatures and having adequate training could deceive the algorithm. It would also be possible to have a system to improve the accuracy of the images and the stroke variation for identifying the forgery signature in an improved version. Most of the offline successes has come in a constrained domains, such as postal address, Bank Cheque and census form (Plamondon and Srihari, 2000).

The system upon testing produced satisfactory results while comparing with the specimen signatures. Therefore, automatic signature verification has the
unique possibility of becoming the method of choice for identification in many types of electronic transactions (Mario et al., 2003).

5.3 SCOPE FOR FUTURE RESEARCH

1. It is acceptable to include a date in the signature on contracts and documents, but not on cheques and credit card receipts. Hence, a verification and interpretation system is required for this type of signature in which a numeral filter will be used to eliminate the numerals of the data from the signature.

2. Extraction of signatures from patterned background is a thorny problem in an image segmentation. An algorithm may be included to create an extraction algorithm, which can extract signatures from different background patterns.

3. As the current research work accepts only grey scale signature, the future work can enhance the work to include color signatures also.

4. New algorithms can be developed to reduce the FAR and FRR.

5. New methods can be developed to improve the percentage in the verification results.