CHAPTER 7

CONCLUSIONS AND FUTURE WORKS

This chapter summarizes the outcome of the research and presents the future enhancements to this work.

7.1 CONCLUSIONS

JPEG has been playing an important role in the image compression field for the past two decades. Quantization table in JPEG scheme is a key factor which is responsible for compression/quality trade-off. Evolutionary algorithms can be used for this type of high dimensional combinatorial problem. The key issues in using the evolutionary algorithms are slow convergence speed, uncertainty in producing the feasible solutions and long computation time. This research has investigated on the enhancement of evolutionary algorithms to address the above issues. The contributions of this research are summarized as follows. First, the evolutionary algorithms such as a GA procedure, developed with elitist property and DE algorithm are applied to find the optimal quantization tables for the desired compression ratio. Second, a domain specific knowledge is injected in KBGA and KBDE respectively in order to enhance the search capability, reliability and the convergence speed of GA and DE respectively. Third, an extensive performance analysis has been made among proposed algorithms in terms of their accuracy, search capability, convergence speed and reliability. Also, a statistical significance test is performed to confirm the efficiency of proposed algorithms. Fourth, a problem approximation surrogate model (PASM) is
used to approximate the unfitness value which reduces the computation time of proposed GAs and DEs without any loss in their performance. From the results, it has been concluded that KBDE guarantees a feasible solution with better search capability and fast convergence speed than other proposed evolutionary algorithms. Also integrated PASM in proposed algorithms guarantees the similar results as needed by an average of 37.18% reduction in computation time.

7.2 FUTURE WORKS

The directions for future research are identified as: analyze other meta-heuristic optimization algorithm, Region of Interest Optimization and Compression as a service in a Cloud.

There are several meta-heuristic optimization algorithms with their own advantages and disadvantages. It becomes essential to evaluate them and identify the application-specific algorithm. The extension of research in this context may analyze and develop an algorithm by incorporating knowledge based search and PASM for quantization table optimization.

It is very essential to preserve the important region of the medical image. Many current compression schemes provide a very high compression rate, but with considerable loss of quality. The extension of research in this context may identify the important region of an image using machine learning algorithms and quantization table optimization may be done based on region of interest.

In order to reuse the proposed algorithm, it may be deployed as a service in the cloud. The extension of research in this context may identify the issues related to the development and deployment of service in the cloud.