

Abstract

Biomedical signal compression is a challenging task as the information inside a biomedical signal need to be preserved during signal compression. This research work presents a few optimization processes for image and video signal compression.

The image compression technique presented in this article is based on lossy vector quantization process. The codebook of the vector quantization algorithm is optimized using Jaya algorithm. A quantized residue image has been added with the compressed signal to preserve the information inside the biomedical signal. The derived optical disk and retinal blood vessel from the original image as well as the compressed image are compared in terms of correlation, specificity and sensitivity to determine the diagnostic essence preservation. The retention of diagnostic essence is seriously improved after combining the residue image with the compressed signal.

The motion vector estimation process is the computationally expensive process in video coding. As a result, this work proposes optimizing the operational parameters of existing motion estimating algorithms in order to lower the computing complexity of the algorithms. Three different processes based on genetic algorithm, cuckoo search and fuzzy inference to modify the operational parameters of test zone search is presented in this article. The article introduces a new statistic, Motion Factor, which is an approximate assessment of motion in a coding unit and is used to optimise operating parameters of test zone search. The optimization processes significantly reduced the computation cost of test zone search.

Other meta heuristic algorithms such as the cuckoo search and ant weight lifting algorithm are modified and used in new optimised block matching algorithms. The modifications which include the nearest neighbour interpolation for fitness approximation, adaptive termination and initial population selection from deterministic distribution, are designed to lower the computation cost of these algorithms. The performance of these algorithms is compared with the state-of-the-art Jaya algorithm-based motion estimation process.