CHAPTER 6

CONCLUSIONS

6.1 PRINCIPAL CONTRIBUTIONS

In this topic, main contributions of the research work are listed for further discussions and investigations are made as follows.

In the research work on H.264 decoder, implementation of the decoder is ported on TIDSP to estimate the memory complexity and computational complexity. From the experimental results following points are noted. For an un-optimized version of the decoder, it is possible to decode less number of frames per seconds. The experiments are conducted for different set of encoded frames of different compression ratios. The results obtained from the different parameters such as MSE, PSNR, MSAD, SSIM and VQM indicates that it is possible to decode the encoded frames much faster without deblocking filter without sacrificing the quality of the video. Even though there is drop in the video
quality, the methodology adapted by removing the deblocking filter can be adapted for mobile applications.

- The critical routines of the decoder block are identified. It is clear that the deblocking filter consumes approximately 33% of the total time required for decoding. The memory usage and computation time can be minimized by implementing the H.264 decoder without deblocking filter. The proposed methodology is better in minimizing the power consumption by reducing the memory usage and decoding at a faster rate.

In the research work on Video segmentation and summarization, proposed method is considered for segmentation and summarization. The different videos of type fade-in and fade-out are considered for the experimentation and the following points are noted. The proposed approach of modified GA is discussed in detail and it is compared with GA. The proposed methodology for modifying the genetic algorithm involves the modification of fitness function. The fitness function of GA is modified by adding extra function which improves the result compared to GA. The experiments are conducted for video segmentation to segment and summarize the frames by using modified genetic algorithm. The experiments are conducted for different sampling factors to reduce the number of frames in a video to select only few frames to view the highlights of an event. The experiments are conducted for different number of segments for summarization.

- The experimental results show that modified GA works better than the original GA.

- The experiments are conducted for different video frames to estimate the computational complexity involved in modified GA in comparison with GA. The results show that modified GA consumes almost same time as GA.
In the research work on image compression, Experiments are conducted to estimate the memory complexity and code complexity involved in implementing SVD in comparison with DCT and HAAR transforms. The SVD with pre-processing is considered to reduce the computational complexity involved in SVD. Experiments are conducted to estimate the memory complexity and code complexity for proposed compression algorithm using modified SVD and compare the algorithm with the other existing compression algorithms. The different input images of different formats and different types are considered and the following points are listed.

- The proposed approach of pre-processing the SVD is discussed in detail to derive the relation between rank $r$ of the block and rank $R$ of the entire image.

- The modified SVD is considered for different block sizes such as 2, 4, 8, 16, 32 and 64 to estimate the computational complexity involved. The experimental results shows that the block size of 32 requires a computation time of 16 seconds to give the compression ratio of 3.12 for each block which is better than the original SVD for a rank of 33 to achieve a PSNR of 30 dB.

- The experiments are conducted for different set of input images to estimate the complexity involved in different functions. The critical functions are selected and optimization can be done to reduce the computation time.

In the research work on image scaling, a method is proposed to scale-up an image reduce the computational complexity involved in the proposed approach. The different input images of different formats and different types are considered and the following points are listed. The proposed approach of image scaling is discussed in detail and the approach is implemented on a DSP. The experiments are conducted to estimate the memory complexity and code complexity for proposed scaling algorithm and compare the algorithm with the other existing algorithms.
The proposed algorithm on scaling reduces the computation complexity in terms of clock cycles compared to bilinear interpolation by utilizing a computation time of 0.018 seconds in comparison with bilinear interpolation which utilizes 0.856 seconds. The quality of the image is 34.5 dB which is better than nearest neighbor which gives a PSNR of 28.2dB.

The proposed approach is considered in a noisy conditions and the approach is compared with nearest neighbor and bilinear interpolation methods for different types of noises.

6.2 FUTURE DIRECTIONS

The research work can be extended to

- The optimization of the code is done to decode more frames per second for the identified critical routines.

- The performance comparison of the decoder can be done by implementing decoder on different processors such as Analog devices, ARM processor, Motorola processor, Stream processor, etc to know the suitability of the processor for the mobile applications.

- The encoded frames of higher resolution such as CIF format can be considered for the implementation and optimization can be done to decode more than 30 frames per second.
• The video segmentation and summarization can be applied to decode only selected frames of the encoded format. The algorithm should decode only key frames which is necessary to view the highlights of an event.

• To use parallel processing of modified SVD to reduce the computation time for image compression.

• Proposed approach is modified to zoom or scale-up the image to any scaling factor. Optimization of scaling parameters can be done for the efficient implementation of image scaling algorithm.

• The video services discussed in the research can be implemented on different processors to compare the performance of the different processors and suitability of the processors for the different algorithms.

• Additional video services such as enhancement, restoration and edge detection on the mobile phone can be provided.

• The applications discussed in the research work can be extended to biomedical applications.

• A hardware device can be provided to embed all the video processing services in the area of biomedical signal processing and it can be used as health monitoring system.