



**INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS**

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**SHORT ABSTRACT**

With the emergence of the scalable video coding (SVC), efficient and secure transmission of scalable video stream becomes an important research topic. In the recent literature, watermarking is regarded as an efficient tool for scalable video authentication. Primary motivation of this entire dissertation, is to develop robust watermarking solutions for different scalable adaptations like resolution, temporal and quality.

In the first part of this work, watermarking issues for resolution and quality scalability have been considered. It has been observed in the literature that there are two basic requirements for the scalable watermarking, firstly the watermark should be extracted from each of the scalable layers and secondly, reliability of the extracted watermark should be increased with the increase of the video quality layers i.e. achieving graceful improvement. In this context, an uncompressed domain watermarking scheme has been proposed to meet both the requirements while maintaining the decent visual quality of the watermarked video.

It is observed that the temporal adaptation is also a serious problem for designing robust scalable watermarking. In the next phase of this work, a robust algorithm has been devised where DCT based motion compensated temporal filtering is used to handle the temporal adaptation. A wavelet based spatial filtering is also used for embedding zone selection to achieve an acceptable visual quality.

Although, the proposed scheme against the resolution scalability outperforms recent existing schemes, its performance can be improved, especially when the resolution scaling is relatively large. In the third phase of the work, a scale invariant feature transformation (SIFT) based image watermarking has been proposed which can easily be extended to the frame based video watermarking. The proposed scheme exploits the scale invariant property of the SIFT feature to devise a robust algorithm when the resolution scaling is relatively high. It can be observed that the proposed algorithm against temporal adaptation, in the second part of the thesis, mostly outperforms the existing

schemes, but it requires a location map for the extraction of the watermark which is an extra overhead. To take away this extra overhead, two schemes have been proposed in the final phase of this thesis, which require no location map for the watermark extraction.

In the first scheme, a SIFT based watermarking algorithm is proposed which is invariant to the temporal scaling and performs well against temporal adaptation and any frame dropping and averaging attacks. In the second scheme, the frames of each temporal layer have been embedded with a different watermark which is generated by block DCT decomposition of a single watermark image to achieve graceful improvement in the successive enhancement layers.

Finally, the thesis concludes by briefly summarizing the works presented in the dissertation and explaining the possible future research directions.

