ABSTRACT

Digital watermarking is a technique to put a secret message which may be logo of a company, name of the creator etc. behind the cover medium which may be image, audio or video. Digital watermarking algorithm should fulfil three requirements of robustness, perceptibility and payload capacity. Digital watermarking algorithms may be designed in spatial domain or transform domain. Watermarking in the spatial domain alters the pixel value directly depending on the watermark and that in the transform domain modifies the frequency coefficients of the cover medium depending on the watermark. This thesis explains three of the spatial domain video watermarking algorithms, namely visible watermarking, invisible watermarking using least significant bit substitution method and invisible watermarking using correlation based approach. Basically visible watermarking is used for giving the identity of the producer of the cover medium that can be made visible on the cover medium. The identity includes transparent and non-transparent parts and the algorithm would superimpose identity on the cover medium in such a manner that the part of the cover medium which is superimposed by the identity is replaced with the identity and the other part remains unaltered. In the invisible watermarking using LSB algorithm MSB of the message is replaced with the LSB of the frame of the video. If the message is of size less than that of frame than multiple copies of the message is placed in the frame so as to make the frame robust against cropping attack. In the third spatial domain method of invisible watermarking, namely correlation based watermarking, one PN sequence is added to the block of the frame of video depending on the message bit. At the receiver side the same PN sequence is correlated with the block of frame and message is recovered based on the amount of correlation achieved. Work continuous in transform domain wherein discrete cosine transform and discrete wavelet transform is used for invisible watermarking. In the DCT based method two pixels are used for embedding the message wherein selections of these pixels are made according to the standard JPEG quantization table. In the DWT based method the frame first undergoes a sub band coding and then horizontal sub band is modified according to the message. One linear algebra method, namely singular value decomposition is also used for the purpose of embedding both binary and gray scale watermarks. Here the singular values of the frame of video are modified according to the message. Finally a hybrid algorithm is explained wherein DCT, DWT and SVD are combined so as to have advantages of all three. For the evaluation of perceptibility
at the transmitter side, two pixel quality matrices are calculated in each of the above mentioned methods, namely peak signal to noise ratio and mean square error. For the sake of evaluation of the robustness i.e., quality of the message recovered at receiver end correlation between the recovered message and original message is calculated for each method. Based on the experiments the hybrid method is found to be better in both perceptibility and robustness point of view.