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Fused image robust video watermarking technique using LWT, SVD and SWT

Haweez Showkat
haweezsk@gmail.com
Islamic University Of Science and Technology, J&K, India

Rohun Nisa
rohunnisa@islamicuniversity.edu.in
Islamic University Of Science and Technology, J&K, India

Dr. Asifa Baba
asifababa@gmail.com
Islamic University Of Science and Technology, J&K, India

Abstract—***In today's era medical video transactions have made healthcare better and economical. But there are concerns related to its security and a risk of misdiagnosis due to deterioration of some parameters of the video during transmission. In this scheme it is proposed to embed two watermarks into a medical video ,one watermark is photo of the patient and another is the basic initial diagnosis by the doctor A unique video watermarking scheme is introduced which uses middle and low frequency bands of cover video and water mark.Two level LWT and SVD are used for embedding and extraction purpose. SWT is used for fusion of watermarks .Several attacks have been applied to the watermarked video for extensive evaluation in terms of PSNR and correlation coefficient (CC) .***

Keywords— LWT, SVD, SWT, PSNR, CC

I. Introduction

The onset of transmission of medical videos and images has enhanced the medical world capabilities many folds and in many directions. Videos can be sent to any expert doctor, to have a better medical diagnosis and regime. It becomes economical as in spite of sending patient from one place to another, simply sending the videos of a CT scan, an endoscopy or a MRI through transmission channel is easier.Doctors can provide emergency solutions to a patient sitting at any remote area of the world. Patients can be monitored while sitting at home e.g. the one who is not able to move remotely. The videos can be used in military and medical education system and has many more benefits.But this has in turn created many issues regarding security, storage, bandwidth, e.t.c. One more concern is that to what degree the video gets corrupted during transmission.

The process of watermarking is very useful to the medical world. There is a common problem of errors due to human mistakes, like labeling or numbering of patients and their respective medical videos or images , which can result in wrong diagnosis of patients. This has been a reason of wrong treatment regime and sometimes has led to death of many patients. In this paper the personal information of the patients in the medical video is embed, in the form of the patient's photo which will be his unique identification mark and his diagnosis report.

When the video is send over transmission line it leads to many deviations in video parameters, due to intentional or unintentional attacks, which can create problems in diagnosis. But by sending the initial diagnostic report along with the video, doctors can correlate the videos with their diagnostic report ,and find out errors if any. Even during transmission if someone tries to tamper the report, the doctor at the receiving end will come to know about it, by reading the initial diagnosis report, embedded in it. It also saves the burden of sending the data separately, which in turn saves the bandwidth to be used, and gives a better storage reduction option. The extra information remains in the video without altering the video much.

In today's world there is a trend of transaction of videos and images through various communication channels. There have been various security related debates for these channels. But if a medical video or image is altered on the way, it can pose a potential threat to patient's life. So it's important to device a method to show if any type of tampering is done on the transacted video .

While watermarking certain attributes have to be kept into account. An important parameter for embedding is strength of watermark(α) , if the strength is high the video becomes robust to many attacks but PSNR decreases i.e. the visual quality of video decreases. And if the strength is decreased the robustness decreases and PSNR increases.

II. Literature Survey

Many papers in the past have been published, giving various techniques for data hiding . In [13] a watermarking method is introduced in which the author uses SVD for embedding the watermark. It adds watermark in singular value of the cover image using a scaling coefficient. It is one of the easiest and less time consuming method for watermarking. The main problem found in techniques using only SVD ,is false positive problem (FPP) ,which can be solved by using hybrid SVD techniques. In[1] author uses DWT and SVD for watermarking of videos. The watermark and cover video are converted into their frequency domains ,the high band of watermark is embedded in singular values of high bands of cover video frames. In [3] author uses DWT to obtain frequency domain coefficients and SVD to embed the water mark in the singular values of the cover image. It uses two watermarks that are fused and after extraction they are retrieved using anti fusion method.Embedding in singular values obtained from the SVD transformed image show high stability however .In both the schemes[1],[3] DWT creates problems of articrafts in boundaries which decreases PSNR . In [36] an RDWT ,SVD based watermarking scheme is introduced, which is aided by HVS entropy calculation for each block .HVS entropy calculation decrease distortion and increase imperceptibly.Arnold scrambling is used for encryption and dycription to increase the security level . As