# Error Correction Technique for H.264 Compatible Video Stream Based on Turbo Codes

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When an encoded video bit stream is transmitted through an error prone environment, it is subjected to loss of packets. When a packet loss occurs, it will usually drop the whole frame. As a result, the video appears distorted and produce unacceptable video quality, making error control techniques highly desirable.

This paper presents an efficient error correction algorithm to further improve the reconstructed video quality during transmission over error-prone channels. There are many ways to accomplish forward error concealment. Essentially, they all add a controlled amount of redundancy at either the source encoder or the transport encoder. In the proposed method, H.264/AVC codec version Joint Model (JM) 17.0 is integrated with turbo coding which is a powerful forward error correction technique to improve the quality of a video.

Video transmission can be divided into three sectors; Transmission end, Channel and Receiving end. At the transmitter, a JM encoder compresses the input video signal and generates an information bit stream. At the same time, a turbo encoder generates a one parity bit sequence using information bit stream and another parity bit sequence using interleaved information sequence and transmits both parity streams with the information bit stream. Due to impairments of the transmission media, received information bit stream is distorted and different from the data that was transmitted. In the receiver, JM decoder detects this received information bit stream and turbo decoder detects two parity bit sequences. At entropy decoding, if the H.264 data stream is correctly decoded and identified as error free, it will be directly sent for inverse quantization. However, in the event of an erroneous data reception, the error-prone frame will be concealed to some extent using the inbuilt JM decoder error concealment algorithm, which is frame copy, where each pixel value of missing macro block is replaced by the corresponding pixel of the previous decoded reference frame. This is then sent to the turbo decoder for further correction using two parity bit sequences.

The proposed algorithm is tested using a simulated Gaussian channel environment. The experimental results show that the proposed method outperforms the existing method, which is frame copy, in terms of objective quality metrics. At the same time, it becomes more efficient for high-motion sequences because the frame copy algorithm fails to recover lost information from the previous frame due to their high motion. Thus, the proposed algorithm is capable of significantly improving the video quality that has been corrupted by transmission errors.