

SMART DIGITAL VIDEO

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Steganography, the art of hiding information under the cover of another signal, is an old technique. In modern times, the rich content of multimedia signals has provided a venue for data hiding. Data hiding must meet a number of criteria while pursuing many objectives. Embedding data in images and video must not detract from the quality of the cover signal. The embedded data must not be easily removed, altered or its content compromised. Data hiding may be used for digital watermarking or fingerprinting. A digital watermark becomes part of the fabric of the signal and cannot be easily removed or identified. A digitally watermarked title can be traced as it changes hands. Authentication watermarks are designed to reveal tampering with the signal. An altered or doctored image can be easily identified by inspecting the embedded watermark for damages. In this project we have developed several algorithms to perform digital watermarking for applications of interest to the Air Force.

One application requires fingerprinting of digital video to assure authenticity of the content. The need for such guarantees arises in situations where surveillance video is in the hands of unfriendly elements for a period of time. Attacks include removal of frames and their replacement with foreign content, re-ordering of frames to alter the sequence of events. We have developed unique algorithms where video is self-watermarked, i.e. the watermark is extracted from the video itself. This approach makes it extremely difficult to swap portions of video and use it elsewhere. The entire operation is performed on MPEG video and in compressed domain.

The second major application is metadata embedding in UAV video. UAV's fly for long periods and continuously collect live compressed video. Along with the video, extensive metadata is collected. Metadata includes flight path information, altitude, camera angle, heading, GPS data, etc. At the present metadata is collected and saved in a separate file requiring security measures and bookkeeping. We have applied our watermarking technology to inconspicuously and securely embed metadata in video. The metadata can be extracted at any time using proper passkeys.