

COMP 7036 Assignment 1

Applied Research Methods in Software Development

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What is the type of research the article is describing?

The article is in the [Transactions on Information Forensics and Security](#) field. The type of research described in this paper is defined as **Applied Research**: The reason why it's not defined as Basic Research is because its intention isn't to enhance one's knowledge about certain methodology/concept but rather propose a new strategy that addresses a practical problem of **data hiding** directly in the "encrypted version of H.264/AVC video stream" .

What is the main research question or problem being addressed ?

While cloud computing has become one of the most important technologies in modern large-scale storage and computing; little to no services exist that protect a users content before it is sent to be stored on the cloud. For example if an attacker gains access to an individual's Google account, they would be able to view all videos and pictures stored in google cloud solution.

The research is to test the feasibility of **encoding** and **encrypting** video with **hidden data** with negligible overhead with methods purposed in the paper such . The writers found this important because it addresses security and privacy concerns when it comes to cloud computing and storage.

What is the methodology carried out?

The research uses **Quantitative research** for the following reasons:

1. The data collected is numerical and used in equations to get results from scientific metrics
2. The results of the research is based on decisions based on calculations
3. The paper does not take personal opinion as data

What is the data being collected, how is it being collected, and how is it being analyzed?

1. PSNR(video quality metric) - Objective video perceptual quality however it's not a perfect comparison for human eye sight. This will be used to compare if the video has lost quality after encryption/decryption and data hiding. $PSNR=10\log_{10}(R_2/MSE)$
2. SSIM (Structural Similarity Index) - index system made for comparing two images. The number 1 indicates an identical image. SSIM is for still image comparisons; To estimate video quality, the average SSIM value over all frames in the video sequence needs to be calculated.
3. VQM (Video Quality Measurement) - This metric is used to evaluate the perceptual quality. A lower VQM value indicates high perceptual video quality and zero indicates excellent quality.
4. Embedding Capacity (kbits/s) to measure maximum payload in each video

The values of the results were entered into tables for easy comparison. The researchers used OSNR, SSIM, VQM to compare the video quality of six different video sequences each at three different embedding capacity using different codeword mappings.

Comment on the value and merit of the research as a whole. Why is it important?

It's important because as we move more towards cloud storage and computing, people of the digital age need to protect their data from malicious admins. Every year news is released of servers being hacked and their content stolen this research shows that it's possible to add another layer of protection to files that are uploaded to cloud storage facilities.

What are the results?

The results show that the proposed method of data hiding causes negligible change in file size and can be decrypted in video streams making it ideal for real-time video.

What are the conclusions?

The in this paper is that embedding additional data in video bitstream is possible and a good way to hide data and can be done alongside encryption while preserving the file size.

Are the claims justified from the data?

Yes as the claims are based on multiple metrics that are well used. The researchers do a good job visualizing the data and performing multiple tests to so that they can explain the reason of the outcomes.

How can future research build on the findings?

Encrypting application data like google drive uploads with 3rd party software. If an attacker ever gains access to a users data the video frames will be scrambled and worthless.