CALIFORNIA STATE SCIENCE FAIR
2004 PROJECT SUMMARY

Name(s)

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Project Number

S1219

Project Title

The Effects of Encoding and Compressing Video File Types Using Various Codecs

Abstract

Objectives/Goals

The purpose of this experiment was to determine which compressed video file type is the best quality, quality being highest mux rate in bits per second, by converting three source files into numerous new compressed ones.

Methods/Materials

Three different source files were collected, one recorded off the television, one recorded on a digital camera and one from a DVD. Using the programs TMPGEnc Beta 12, TMPGEnc 2.52, DVD2AVI, Smart Ripper v2.34, Roxio Video Pack 5 and Flask Mpeg the source files were converted into numerous types of MPEGs, WMVs and AVIs and were then checked for qualitative and quantitative characteristics. The compression ratio, quality in bits per second, and visual quality of each file were compared with each other and the source files.

Results

The highest quality file converted from the Internet MPEG was the dragon720.wmv (Windows Media Video WMV) 720x480 with mux rate 1576000 bits/second. The highest quality file from the DVD source Vob files was the MSV1.avi (AVI using Microsoft MPEG-4 3688 V1 codec) 720x480 with mux rate 2419369 bits/second. The highest quality file from the source MPEG recorded on the digital camera was the CAM352m1.mpg (MPEG-1) 352x240 with mux rate with 1411200 bits/second. The best out of the three in quality and compression was the MSV1.avi.

Conclusions/Discussion

After comparing the three highest quality files from the original three source (control) files, the CAM352m1.mpg (MPEG-1) 352x240, the MSV1.avi (AVI using Microsoft MPEG-4 3688 V1 codec) 720x480, and the dragon720.wmv (Windows Media Video WMV) 720x480, the MSV1.avi had the bigger mux rate of 2419369 bits/second, outscoring the other two mux rates of the CAM352m1.mpg (1411200 bits/second) and the dragon720.wmv (1576000 bits/second). The other important element of compression is size, and the MSV1.avi also outperformed the other files in compression level. The MSV1.avi was only 36.4% the size of its control/source file, while the other two were more than 36.4% the size of their respective controls. The data shows that the MSV1.avi with resolution 720x480 is the highest quality compressed file therefore the hypothesis of the MPEG-2 with resolution 720x480 from the source DVD data was proved incorrect. The data suggests that the later versions of the Microsoft MPEG-4 codec are not any better than their predecessor and that the WMA, MPEG-1 and MPEG-2 are not as efficient.

Summary Statement

This project was about finding out which type of video file has the best overall quality (mux rate) along with the highest level of compression by testing three source files and converting them to numerous new files.

Help Received