AVS-M Encoder Optimization
For Real-time Video Streaming

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Overview

I. Technology Introduction

Our system is featured by utilizing two leading-edge Video and Audio compression technologies – AVS-M and AAC respectively. AVS-M is a new coding standard for compressing digital Video developed by China. With significantly low cost, it is seen as part of moves to shift reliance away from Western formats. AAC, known as a Music Codec, is widely promoted as the successor of MP3. It can dramatically reduce the amount of data needed to convey high-quality digital audio.

II. System Specification

Our project implements a Real-time Video Streaming system with a Chinese Chess Game as an application. Specifically, the AVS-M Encoder is optimized to achieve high compression speed and quality in order to support real-time video conferencing. The system can also support Digital Recording to save the captured real-time video and audio in AVS and AAC formats. The Chinese Chess Game Application enables the two players to see each other in the application window when playing the game. It is superior to the currently existing online games by providing the video conferencing feature and therefore increases the interactions between players.
System Components

A. Server

I. Video
- Real-time Capture and Preview
- AVS-M Encoder
- QCIF (176 x 144) and CIF (352 x 288) Formats

III. Audio
- AAC Encoder
- Real-time Capture and Replay
- 8000 samples/sec
- 16 bits/sample

B. StreamPlayer

I. Video
- Real-time Playback
- AVS-M Decoder

II. Audio
- Real-time Playback
- AAC Decoder

III. Player
- Video and Audio Synchronization
- Packet Reorder

II. Network
- RTP (Real-time Protocol)
- Data Rate Control
- Packet Retransmission

Figure 2: GUI of Video Capture at Server
Results

A. System

Our project has successfully constructed the system environment in which the AVS Encoder could be embedded. Moreover, the features of our system have been extended to a real-time Chinese Chess Game.

The biggest challenge was how to merge the Server and Streamplayer into one single product.

B. Encoder Optimization

For real-time video compression, speed of encoder plays an important role in the quality of video streaming. In this project, the encoder is optimized using:
- E-PMVFAS: Advanced algorithm for motion estimation
- SSE2 (Single SIMP Extensions2): A group of 70 instructions added to the Pentium 4 chip for parallel computation.

Figure 4 compares the performance of motion estimation using the traditional method, Full Search, and E-PMVFAS. It