

Video Streaming Protocol Hands-on Workshop

Dear Techies,

Preface : This lecture aims at understanding implementation issues on international image/video standards such as JPEG, MPEG, H.264,... and taking practical lab exercises coded in Visual Studio and C. Lecturer will conduct every day workshop discussing functional issues in the source code for 3 hours and supervising a practical course for later 3 hours. Some background reading on digital image processing and information theory is preferably recommended as prerequisites in this course.

Lecturer: Dr. JJ Hwang, who is author of several Image/video data compression and processing, Digital broadcasting, Integrated Multimedia processing related papers /Books. Lab Assistance from embeddedACT.

Course Outline:

JPEG Algorithm and Practice in C (Day 1)

Introduction

Standards Overview

Analog TV: Basic Concepts

Digital TV: Component vs. Composite

Theoretical Base for Compression/Decompression

Need for Data Compression

Information Theory Concepts

Visual Psychophysics

Predictive Coding

Motion Estimation

Transform Coding

Sub band Coding

Vector Quantization, etc.

Examples of Codec Designs

p*64 Standard

JPEG Standard

Overview of JPEG

Major Steps

A Glance at the JPEG Bitstream

Four JPEG Modes

JPEG 2000

Lab Exercises (Day 1)

MPEG 1,2 Algorithm and Practice in C (Day 2)

MPEG-1 Standard

Functional Block Diagrams

Syntax and Semantics

Video Compression

Audio Compression

System Layer

Lab Exercises (Day 2)

MPEG-2 Standard

Video Compression

Audio Compression

System Layer

Program and Transport Streams

Comparison with MPEG-1

MPEG-2 Distribution

Optical Recording of the MPEG-2 Data Stream

End-to-end TV Distribution

Lab Exercises (Day 2)

MPEG-4 Algorithm and Practice in C (Day 3)

MPEG-4 Standard Overview Version 1, Version 2

Theoretical Base: tools, concepts, principles

Summary - MPEG-1-2 bases

Arithmetic coding

Shape representation: binary and gray-scale (alpha) planes

Mash (object plane) based presentation

Shape-adaptive DCT and DWT

Global and local motion compensation

RVLC, etc.

MPEG-4 Video

Natural video coding

Texture coding

Synthetic video

Lab Exercises (Day 3)

H.264 Algorithm and Practice in C (Day 4)

Advanced Video Coding (AVC) - H.264

Compression tools

Prediction:

Prediction of Intra Macro blocks

Transform and Quantization

Reconstruction filter

Interlaced Video

Flexible Macro block Ordering (FMO)

ENTROPY CODING

(Universal) Variable Length Coding

Content-Based Adaptive Arithmetic Coding (CABAC)

Switching P and I slices

Future extensions

Lab Exercises (Day 4)

DURATION

4 days