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TITLE : Layered coding informative text

PURPOSE : Discussion

1. Introduction

The following text is put forward as draft informative text for layered coding in response to MPEG93/214. A reference system based upon data partitioning syntax is used as an illustration of layered coding. Results from data partitioning experiments are required to complete this draft text.

1.2 Encoder Assisted concealment

Layered coding

The components produced by a practical coder can be placed in a hierarchy of importance according to the effect of loss on the reconstructed image. Superior error concealment performance may be possible by coding and multiplexing components of similar importance into independent bitstreams.

Strategies available for producing hierarchically ordered bitstreams, or layers, include

data partitioning - the macro block syntax is partitioned into multiple channels such that lower order channels contain address and control information and lower order DCT coefficients, while upper channels contain high frequency DCT coefficients.

frequency scalable pyramid - similar to data partitioning but lower order DCT coefficients are included within every channel. These lower order coefficients are a refinement of the quantisation error of the layer below.

spatial scalable pyramid - all DCT coefficients are a refinement of the quantisation error of the layer below.

These strategies produce channels which, when added progressively, produce increasing quality of the reconstructed signal. While some of these source coding techniques may result in a bit rate increase compared to the system without layering, the performance of the layered systems when subjected to channel errors, may be greater.

The hierarchically ordered channels are handled with due quality, such that some cost function is minimised. This cost should be lower than that required for the system without layering. The channels may be treated differently at one or more of the following locations:

coder - different channel coding might be used.

channel - different channels may offer different error performance

decoder - error concealment could be performed differently within each bitstream

The costs respectively are the amount of redundancy introduced, the channel quality, and the decoder hardware complexity.

A two layer data partitioning scheme, and the use of two channels with different error performance, are used here to illustrate the error concealment capability of layering.

At the coder the value of the PBP pointer may be

fixed - this implements a subband scheme

variable - the PBP pointer may be different for each slice such that the distribution of bits between the two channels is constant. The distribution may be different for I, P, and B frames.

Data partition 0 contains the address and control information and the low frequency DCT coefficients, while data partition 1 contains the high frequency DCT coefficients.

Two independent channels are required. Channel errors are distributed so that data partition 1 receives most errors.

It is assumed that at the decoder channel errors can be detected, so that actions can be taken to prevent errored data from being displayed. For data partition 1 errored data is simply not displayed. For data partition 0 a suitably high quality channel, or decoder concealment actions are required.

[Required: results showing performance advantage].