Motion-Compensated JPEG 2000

Colorsacpe Conversion

Layered Bitstream

GOP side information

JPEG 2000 Encoder

Motion vectors

Multicomponent Scaling

Scaling coeffs.

Motion Compensated Temporal Filter

Output

t

R G B

Y

Cb

Cr

Scale

Scale

Scale

HVSBM

ty tCb' tCr'

Motion vectors
Closed-Loop Hierarchical MC-JPEG 2000

Low Resolution Input Sequence

R₀

ME/MCTF

Temporal Subbands

t₀, t₀

ME/MCTF

MVs

Σ

Δ₁

{t₁}₁

θ

Enhancement Layer Bit-stream

JPEG 2000 ENCODER

Base Layer Bit-stream

Next-Higher Resolution

R₁

Spatial and Temporal High Subbands

JPEG 2000 ENCODER

JPEG 2000 DECODER
Open-Loop Hierarchical MC-JPEG 2000

Low Resolution
Input Sequence

R_0

ME/MCTF

Temporal
Subbands

t_H^0

Low-Pass
Filter

\Delta_{LPF}

High-Pass
Filter

\Delta_{HPF}

{t_L^1}_{LL}

{t_L^0}

Next-Higher
Resolution

R_1

ME/MCTF

Spatial and
Temporal High
Subbands

JPEG 2000
ENCODER

Base Layer
Bit-stream

Enhancement
Layer Bit-stream

JPEG 2000
ENCODER

Base Layer
Bit-stream
Closed-Loop Results for *Harbour* (SD)

Most rate allocated to low-res.

Most rate allocated to high-res.

- High-res Rate=0.3 Mbps
- High-res Rate=0.9 Mbps
- High-res Rate=1.5 Mbps
- High-res Rate=2.1 Mbps
- High-res Rate=3.0 Mbps

High resolution PSNR Y (dB)

Total rate $R_{tot}$ (kbps)
Open-Loop Results for *Harbour* (SD)
System Features

- **Motion-Compensated JPEG 2000**
  - Combines the versatile motion compensated temporal filter with an industry standard JPEG 2000 codec.
  - Scalable wavelet/subband coding is performed both temporally and spatially.

- **Hierarchical MC-JPEG 2000**
  - Codes up through the desired resolution level, eliminating the need to process unneeded higher resolutions.
  - Closed-loop system is an extension of MC-JPEG 2000.
  - Open-loop system eliminates the embedded decoder, reducing the complexity of the encoder.