Multihypothesis Pictures for H.26L

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Introduction

Goal
- Improved motion-compensated prediction for efficient video compression with ITU-T Recommendation H.26L
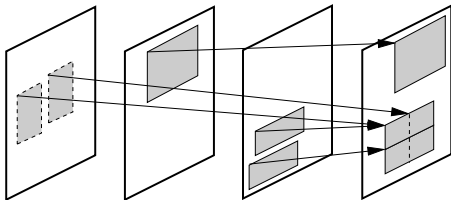
Approaches
- Linear combination of motion-compensated signals
- Forward-adaptive selection of reference frames for motion-compensated prediction

Advantage
- More than "additive" gains can be achieved by combining both approaches
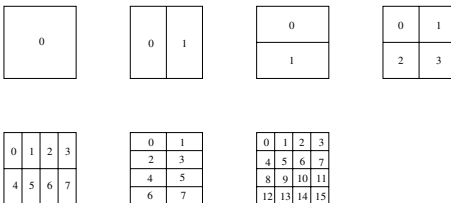
Multihypothesis Pictures

- Prediction signals from temporally prior decoded frames (1-hypothesis mode)
- Linearly combined prediction signals from temporally prior decoded frames (2-hypothesis mode)
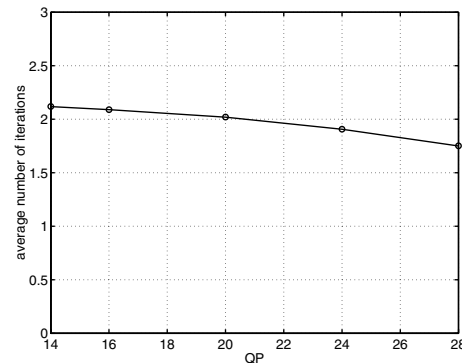

Macrohypotheses – Prediction Signals
- Picture reference parameter
- Block size data
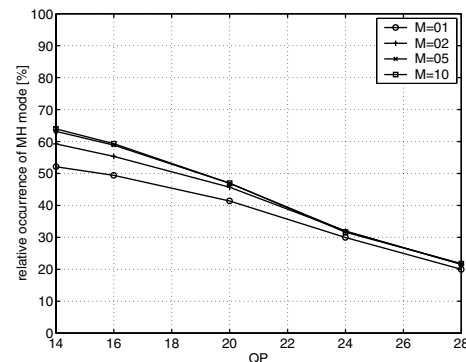- Motion vector data

Multihypothesis Motion Estimation

Iterative Algorithm
- Conditional rate-constrained motion estimation
- Determines conditional optimal picture reference parameter, block size type, and motion vector data
- Converges practically after 2 iterations
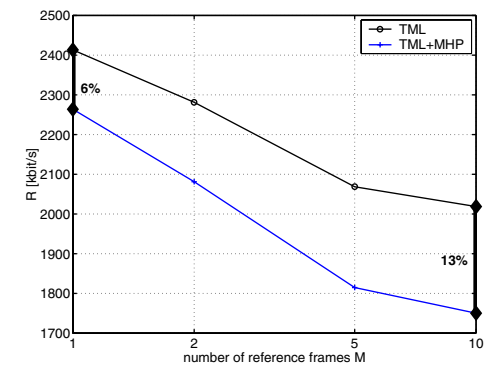

Rate-Constrained Mode Decision
- Relative occurrence of the 2-hypothesis mode increases for higher picture quality
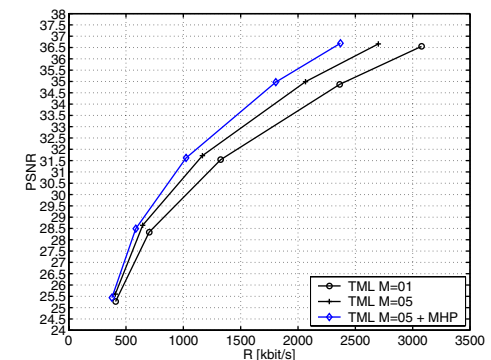- Dependent on the long-term memory buffer size

Experimental Results

Bit-Rate Savings and Memory Buffer Size
- Sequence *Mobile & Calendar* in CIF resolution with 30 fps at 35 dB PSNR

RD-Comparison to Single Frame Codec

References

[1] B. Girod, "Efficiency Analysis of Multihypothesis Motion-Compensated Prediction for Video Coding," IEEE Tr. on Image Processing, vol. 9, no. 2, pp. 173-183, Feb. 2000.

[2] M. Flierl and B. Girod, "Multihypothesis Motion Estimation for Video Coding," in Proc. DCC, Snowbird, Utah, Mar. 2001.