Multi-Hypothesis Motion Compensated Prediction (MHMCP) for Error-Resilient Visual Communication

Wei-Ying Kung
C.-C. Jay Kuo

Research Goal
- Investigate the error propagation effect in an MHMCP coder
- Analyze the rate-distortion performance in terms of the hypothesis number and hypothesis coefficients
- Design MHMCP coder to improve error resilient capability
  - Adapt hypothesis number
  - Adapt hypothesis coefficients

Role in IMSC
- Techniques of continuous media streaming play an important role in IMSC strategic plan
  - Examples include video streaming, mobile phone, telemedicine etc
- Transmission errors are inevitable in wireless channels or Internet
  - Error resilient coding is necessary to be integrated.

Research Approach
- Predict a Macroblock (MB) from a weighted superposition of more than one reference MBs
- By carefully selecting the hypotheses and their weighting coefficients
  - Achieve coding gain
  - Enhance error resilience

Accomplishments
- Several design principles for the MHMCP coder are derived
- Up to 5dB PSNR improvement comparing video codec with single hypothesis
- Publications
  - Error resilient video transmission with multi-hypothesis motion compensated prediction, Proc. ISCAS, Vancouver, Canada, May, 2004

Uniqueness & Related Work
- A thorough analysis of the error resilience property of MHMCP is given
- An adaptive MHMCP codec is designed

5-Year Plan
- Continue to develop new error resilient schemes
- Develop content and channel adaptive coding and networking protocols for QoS
- Seek major breakthrough in next generation multimedia compression and networking schemes