Wyner-Ziv Side Information Generation

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(Guidance from Dr. Jin-soo Kim)
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- Overview of Wyner-Ziv CODEC
  - WZ encoder
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• Overview of Wyner-Ziv CODEC
WZ Encoder
**WZ Encoder**

- Encoder is simple in complexity
  - H.264 Intra Key frames
  - Calculate WZ frame residual
  - Quantization
  - LDPCA Encoder
  - Rate Control

- No motion estimation!
WZ Decoder

[Peixoto, R. de Queiroz, and Mukherjee 2008]
WZ Decoder (Contd)

- Complex Decoder
  - Decode H.264 Intra Key frames
  - Side Information Generation
    - Estimation of frame to be decoded
    - Previously decoded frames are used for estimation
    - Motion estimation is done here
- LDPCA Decoder
  - Theoretically WZ codec can achieve the same efficiency as regular encoder-decoder pair
• Side Information Generation
Motion Estimation

- Forward ME between key frames
- Backward ME between key frames
- Derive MVs for WZ frame using Key frame MVS

[E. Peixoto, R. L. de Queiroz, and D. Mukherjee 2008]
Motion Estimation (Contd)

- **MV resolution**
  - Fullpel MV
  - Halfpel MV
  - Quarterpel MV

- **Partition modes**
  - Fixed 16x16
  - Fixed 8x8
  - Fixed 4x4
  - Dynamic partition modes: 16x16, 16x8, 8x16, 8x8, 8x4, 4x8, 4x4
• Any available frame can be used as a reference
• Hierarchical structure can be used

[A. Aaron, E. Setton and B. Girod 2003]
Motion Compensation

- Depending on MVs available for each block
  - Forward motion compensation
  - Backward motion compensation
  - Bidirectional motion compensation
  - No motion compensation. Intra prediction is used here.
- Filters and Interpolation scheme used for sub-pel MC is same as that defined in H.264 standard [6].
Intra prediction

- Defined in H.264 standard
- Nine different directional prediction modes
- Uses neighboring blocks from the same frame
• Status
Basic Encoder Decoder

- Integrated LDPCA encoder/decoder with JM encoder/decoder

- Side information using simple averaging of key frames

- Side information using ME
  - 4x4 block size
  - Full pel only
  - Forward only
Preliminary Results
• Plan
Future Tasks

- Motion estimation
  - Sub-pel
  - Partitions
  - Bidirectional

- Motion Compensation
  - Sub-pel
  - Partitions
  - Bidirectional

- Intra prediction
- Increase number of WZ frames between Key frames
Q & A

Thank You 😊