Group of Pictures (GOP)

- 12 frames from I-Frame to I-Frame
- 8:1 to 30:1 compression ratio
- IBBPBBPBBPBBI

Types of Compressed Frames

- I-Frame (Intraframe)
- P-Frame (Predictive)
- B-Frame (Bidirectional)

I-Frames

- Compressed in isolation like JPEG (DCT)
- Highest bits per frame
- Least amount of error
- Provides random access points

P-Frames

- Encoded in relation to previous I-Frame or P-Frame
- Better compression than I-Frame
- More error
- Use motion estimation on a macroblock basis
  - Block = 8 x 8 pixels
  - Macroblock = 4 blocks

<macroblock graphics>

Motion Estimation

<motion estimation graphics>

- Motion Vector
  - tells decoder how much to shift
- Error Estimate
  - tells how much motion vector is off
- If no “good” match, encode regular block

B-Frame

- Encode with respect to
  - previous I-Frame or P-Frame
  - next I-Frame or P-Frame
- Achieves highest compression ratio
- Longest to encode
- Usually not sent over network
- Use the best prediction
  - backward match
  - forward match
  - average of backwards and forwards

<B-Frame example graphics>

MPEG NOTES

By Dale Kolosna

These are the notes from the MPEG talk I gave on April 2, 1996 in CS8113D - Multimedia Systems. Not included are the graphics I presented. If you would like copies of these graphs, send your request to kolosna@cc.gatech.edu.

MPEG - Moving Picture Experts Group

- MPEG-Video
- MPEG-Audio
- MPEG-System
  - Synchoinization of audio and video

MPEG

- One standard
- Addresses limited bandwidth problem
- Real-time encoding/decoding

System View

<system view graph>

Features of Video Compression Algorithm

- Random Access
- Fast Forward/Reverse Searches
- Reverse Playback
- Audio-Visual Synchronization
- Robustness to Errors
- Coding/Decoding Delay
- Editability
- Format Flexibility
- Cost Tradeoffs

MPEG takes advantage of redundancy

- Spacial Redundancy
  - Close pixels are related
  - Intraframe compression (JPEG)
- Temporal Redundancy
  - Frames are related
  - Interframe compression