Multimedia Systems

EEL707

Major (2010)

F.M = 35 Time: 2 hr

1. Answer following questions briefly:
   a. What is MIDI? Can we use MIDI like scheme for audio compression?
   b. Given a gray level image where pixels are represented using 12 bits, a compression engineer decided to use only 6 bits per pixel in the image for storage. When the stored image is displayed some problems were observed. Can you guess what could be the problem? Can you provide an explanation for the problem?
   c. What is shape scale space? How can it be used for similarity based object retrieval?
   d. What is the utility of using RTP in streaming real-time video?
   e. Why JPEG 2000 standard use wavelet transform instead of DCT?

   (2x5 = 10)

2. MPEG-4 is not a compression standard but in reality a multimedia architecture. Explain how MPEG-4 supports the following
   (i) Combination of video stream coming from two distinct sources
   (ii) User selectable multi-lingual audio channel
   (iii) Implementation of a talking head (2+1+2)

3. Design a scheme for implementation of MP3 compression scheme for audio signals. (5)

4. Design a video streaming scheme. Your design needs to address the following: (5)

   (i) Video data rate should be as uniform as possible

   (ii) Robustness against transmission errors

   (iv) Efficient Jitter handling and buffer management at the receiver.

5 4. Design a content based video retrieval system which works in the compressed domain (i.e makes use of compressed MPEG-2 videos only). For retrieval, colour and motion based features are to be used in Query-by-example mode. (5)

6 5. Consider the basic operation required for motion compensation : computation of absolute difference between two blocks of pixels. Provide C-like code of the operation; show how can it be restructured for exploiting instruction level parallelism. You can make assumptions about processor architectures. (5)