Multimedia EEL 707
Major (2007)
Time: 2hr; Full Marks: 35

1. Consider the problem of transmitting a video stream over a heterogeneous network where capacity of the outgoing channel is less than that of incoming channel. The frame-rate of the video has to be reduced to meet the requirements of outgoing network. Design a scheme for reduction of the frame-rate of the video so that the overhead of decoding and re-encoding of the video stream can be minimized. Assume the incoming video to be MPEG-1 encoded, consisting of I and P frames. (5)

2. Answer following questions briefly: (2x5=10)

(i) Suggest a scheme for finding out buffer size requirement at the client side for streaming video application.

(ii) Suggest a scheme for distinguishing between voiced and unvoiced component of speech

(iii) Design a scheme for colour based indexing of images so that the search time remains almost constant for image collection of any size.

(iv) Discuss why a video sequence is expected to be compressed more efficiently using simple/base profile MPEG-4 encoder than MPEG-1/MPEG-2 encoders.

(v) Discuss advantages and disadvantages of laxity based scheduling.

3. Motion estimation is the most compute intensive task in video encoding. For real time task scheduling, a strategy is to flexibly structure the task so that quality of its output depends upon the execution time allotted but deadlines are never missed if the task gets allotted minimum required time slot. The task produces valid output for every time chunk allocated. Result improves with allocation of additional time slot. Suggest a way to re-design motion estimation algorithm to meet the above-mentioned requirement. (5)

4. (i) What was the necessity of RTP protocol for time sensitive data delivery over IP networks? Explain clearly significance of additional features provided by RTP.
4.(ii) What functional role is played by RSVP protocol? (3 +2)

5.(i) With the help of an example of low-pass filter kernel, explain how SIMD instructions in a processor can speed up this operation for a 2D image.
5(ii) What are the advantages of VLIW processor for multimedia applications? (3+2)

6. Design (i) block placement and (ii) disk scheduling and (iii) file management policies for implementing a video server which provides near video on demand service with VCR like functionality. (5)