CS510 Intro to Multimedia Networking: Homework #4

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Problem 1

What are four main differences between GIF and PNG?

1) Color Pallet. GIF uses only 256 colors pallet, when JPEG is full color (24 bit)
2) Encoding. GIF uses rather simplistic encoding, like LZW, when creating JPEG images is fairly complicated.
3) Purpose - GIF great for images that use small set of colors for example logo.
4) Tunable compression rate. JPEG images quality can be adjusted, whereas GIF cannot.

Problem 2

Why is zig-zag reordering used in JPEG compression?
Resulting matrix after quantization tend to contain most of the coefficients clustered together in the upper left corner. Zig-zag reordering helps to keep most of the zero coefficients together.

Problem 3

What are the entropy encoding techniques employed in JPEG?

JPEG uses all encodings studied so far: run length (RLE), Huffman, LZW, zig-zag reordering.

Problem 4

What is the main difference between how the macroblocks are encoded in h.261 versus MPEG-1?

The main difference is that MPEG-1 in addition to I and P frames can contain B frames - motion based bidirectional predictive coding frame, which uses both past reference frames and future reference frames, which allows higher compression rate.

Problem 5

Suppose we have a set of frames (number 1 ... n) that we would like to compress into MPEG-1 with the following frame types:
I_0 B_1 B_2 I_3 P_4 B_5 P_6 I_7 B_8 B_9 I_{10} I_{11} B_{12} B_{13} P_{14} P_{15} P_{16} I_{17}
Assuming, they all fit into one group of pictures (GOP), what order do these frames appear in the compressed stream?

Frames should be reordered so each frame that depends on another frame should appear after it in the compressed file.
I_0 I_3 B_1 B_2 P_4 P_6 B_5 I_7 I_{10} B_8 B_9 I_{11} P_{14} B_{12} B_{13} P_{15} P_{16} I_{17}