

5C1 Video Processing : Assignment 2

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This assignment is worth 20% of your final mark. The deadline for submission of your report is as shown in Blackboard.

Your test sequence is dancing_org.1280x548.mp4. You can find copious information about ffmpeg at <http://ffmpeg.org/documentation.html>.

Preamble

This assignment is about transcoding for streaming with DASH. You investigate the tradeoff between different strategies for creating DASH representations. Please refer to the Compression Laboratory material for information about ffmpeg. Note that you can include diagrams (e.g. flow charts) in your report to help explain your ideas. USE THE REPORT TEMPLATE TO ANSWER THESE QUESTIONS. PAGE LIMITS ARE STRICTLY ENFORCED.

Instructions

Create appropriate representations for H.264/DASH format streaming of your test sequence, using information from lectures about streaming and the typical available bandwidth. Assume only one segment of the same duration as your sequence is needed. You must use three resolutions of your test sequence : 720p, and two downsampled resolutions at 360p and 180p to cover the bitrate range. Note that in this example, because of the aspect ratio of the file, the actual resolutions deviate from these values a little.

The original .mp4 and three .yuv raw data files are supplied in Bb. They correspond to the three resolutions required for creation of the representations. Note the slightly unusual resolution of the 3 files. You should use single pass CBR encoding in your experiments. Note that only the first 5 seconds of the original .mp4 file are being used in this experiment. For the bitrates needed in creation of the RD curves the following values are suggested.

	Size	Suggested Bitrates for RD curve (Kbps)						
720p	1280×548	512	1024	2048	3072			
360p	640×274	96	128	256	384	512	1024	2048
180p	320×138	64	96	128	256	512	1024	

Your report

Your report should follow the template supplied. The template details the questions that should be answered. These are summarized below.

1. Describe, explain and justify the algorithm you use to analyse RD behaviour and choose the parameters for your 3 representations. Remember to explain how you generate the PSNR that is used to compare representations. Include a block diagram of the core element of your PSNR comparison system. [30%]
2. Show on a single R/D plot, the RD curves for each of your representations. Label your axes appropriately. Also show the operating points for your three representations as well as any other annotation which helps explain your selected points. [30%]
3. State the PSNR and bitrate of your chosen 3 representations. [10%]
4. Estimate the threshold bitrate at which the quality of 360p is better than 720p, and the quality of 180p is better than 360p. Explain any observations about these thresholds or the difficulty in establishing them. [10%]
5. A video streaming company assigns a default target bitrate (B_l) for its representation (V_l) at 360p that is halfway between the appropriate thresholds. Calculate the bitrate and PSNR of this 360p representation at B_l . [10%]
6. Explain and comment on the difference between the representation V_l at 360p and your chosen representation. [10%]