C00 Exercise 5: cut

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(0: 299 words)

The human eye is more sensitive to shapes than colours, so images with imperfect colours can look good. This suggests a method for compression: store just enough colour information to recover full colour imperfectly. Algorithms for adding colour to greyscale originals already exist. Brooks et al. investigate the application of two such algorithms to image compression.

The first algorithm, named colorization, assumes adjacent pixels with similar luminance are likely to have similar colours. Colorization propagates the colour information given for a small subset of pixels. The second algorithm, joint bilateral filter (JBF), combines two images by using one to guide noise removal in the other. JBF blurs away noise in a highly compressed colour image without bleeding over the edges preserved by a less compressed greyscale.

Brooks et al. use JPEG to compress luminance and either evenly spaced coloured pixels (colorization) or high compression JPEG (JBF) for colour. They compare the recoloring methods to JPEG at quality to match compressed file sizes. By varying the number of coloured pixels or the quality of the colour image, they cover a range of compressed file sizes, up to a compression factor of 400. For colorization, comparison is by Peak Signal to Noise Ratio (PSNR); for JBF, by visual inspection.

Colorization was better than JPEG on images with large areas of smooth colour, but worse on images with fast colour variation. Degradation in PSNR with increasing compression was often linear, like for JPEG, but was erratic in an image with large

monochromatic areas. Whereas JPEG generates blocky artefacts, colorization produces a smoother image with washed-out colour.

JBF showed improved luminance detail over JPEG, using space left over from highly compressing colours. JBF also showed fewer colour shifts, but sometimes lost vividness. The computational cost of JBF is higher than of JPEG.

(1: 275 words)

The human eye is more sensitive to shapes than colours: images with imperfect colours can look good. This suggests a compression method: store just enough information to recover imperfect colours. Algorithms for adding colour to greyscales exist. Brooks et al. investigate using two such algorithms for compression.

The first algorithm, colorization, assumes adjacent pixels with similar luminance have similar colours. Colorization propagates colour information given for a small subset of pixels. The second algorithm, joint bilateral filter (JBF), combines two images, one guiding noise removal in the other. JBF blurs noise in a highly compressed colour image, respecting edges preserved by a less compressed greyscale.

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(2: 243 words)

Images with imperfect colours can look good, because our colour sensitivity is modest. This suggests a compression method: only store enough colours for imperfect recovery. Brooks et al. investigate compression using two algorithms for adding colour to greyscales.

The first algorithm, colorization, assumes similar luminance and location implies similar colours. Colorization propagates colours given for selected pixels. The second algorithm, joint bilateral filter (JBF), combines two images, one guiding noise removal in the other. JBF blurs noise in a highly compressed colour image, preserving edges in a greyscale.

Brooks et al. use JPEG for luminance and either evenly spaced pixels (colorization) or high compression JPEG (JBF) for colour. They compare the recoloring methods to JPEG, matching compressed file size. By varying the number of coloured pixels or the colour image quality, they cover a range of file sizes, up to a compression factor of 400. For colorization, comparison is by Peak Signal to Noise Ratio (PSNR); for JBF, by inspection.

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JBF showed improved luminance detail over JPEG, using space previously used for colours. JBF also showed fewer colour shifts, but sometimes lost vividness, and had a higher computational cost.

(3: 215 words)

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The first algorithm, colorization, assumes similar luminance and location implies similar colours, propagating colours given for selected pixels. The second algorithm, joint bilateral filter (JBF), removes noise in a highly compressed colour image using a greyscale for edge information.

Brooks et al. use JPEG for luminance and either evenly spaced pixels (colorization) or high compression JPEG (JBF) for colour. They compare against JPEG, matching compressed file size. By varying the number of coloured pixels or the colour image quality, they cover a range of file sizes. For colorization, comparison is by PSNR; for JBF, by inspection.

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Our colour sensitivity is modest: imperfect colours can look good. Compressed images, then, might benefit from storing less colour. Brooks et al. investigate compression using algorithms for recoloring greyscales.

The first algorithm, colorization, propagates colours given for a few selected pixels. The second algorithm, joint bilateral filter (JBF), combines a highly compressed colour image with detail from a greyscale.

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Colorization beat JPEG on large colour areas, but struggled with fast variation. Colorization produced smoother images, but more washed-out colour. JBF showed improved luminance detail over JPEG, and fewer colour shifts, but less vividness.

(7: 95 words)

Imperfect colours look good, justifying image compression that stores less colour. Brooks et al. investigate compression using recoloring algorithms. The first, colorization, propagates colours from selected pixels. The second, joint bilateral filter (JBF), combines a highly compressed colour image with greyscale detail. Brooks et al. compare these to JPEG of matching file size, using PSNR (colorization) or by inspection (JBF).

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