EEE6086 Video Processing & Analysis
Coursework
Department of Electronic & Electrical Engineering

Last Submission Date: 15 December 2013
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The coursework contributes to 40% of the overall module marks.

Local and Non-local Filters for Compression Artifacts Reduction

The aim of this coursework is to understand the properties of compression artifacts and to compare the performance between local filters, e.g. [1], and non-local filters, e.g. non-local means [2]. Most image and video materials are compressed using various compression standards, such as JPEG, MPEG-1/2/4 and H.264. These block-based transform coding standards divide an image or a video frame into non-overlapping blocks (usually with the size of 8 x 8 pixels), and apply Discrete Cosine Transform (DCT) on them. The DCT coefficients are thus quantized independently. In low bit rate image or video coding, the coarse quantization will usually result in various noticeable coding artifacts, including the blocking, ringing and mosquito artifacts. Among them, the most annoying are the blocking artifact, which exhibits artificial discontinuities at block boundaries.

Based on the knowledge you learned in the lectures, design a local filter and a non-local filter for reducing artifacts in JPEG decoded images. The performance of both filters should be evaluated and discussed. The original images and their JPEG decoded versions for testing can be downloaded from: http://hercules.shef.ac.uk/eee/teach/resources/eee6086/eee6086.html. The designed algorithms, their implementation details, experimental results and evaluation should be presented in the style of a technical report.

References
[1] L. Shao and I. Kirenko, "Coding Artifact Reduction Based on Local Entropy Analysis", IEEE Transactions on Consumer Electronics, Vol. 53(2), pp. 691-696, May 2007.
[2] A. Buades and B. Coll, "A non-local algorithm for image denoising", IEEE Conference on Computer Vision and Pattern Recognition, 2005.

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