**Software Methodologies COMP2231**

**2019/2020**

**Image processing assignment**

**cvlp22**

D1 – description of the non-local means algorithm … read paper [1] and reference it frequently.

The non-local means denoising algorithm is an effective algorithm for removing noise from a desired image. The purpose of denoising algorithms is to recover the original image from its noisy counterpart; we can add gaussian white noise to an image and then apply our denoising algorithm to the noisy image and compare the result to the original image to evaluate its effectiveness. The principle of denoising an image is in most cases obtained my averaging; some algorithms perform averaging locally, by minimizing variation in the pixel neighbourhood, using calculus, or by frequency analysis and wavelet thresholding methods. Some examples of these types of denoising algorithms include, Gaussian filtering, anisotropic filtering, total variation minimization and neighbourhood filtering. The non-local means algorithm that will be described below also uses averaging. However a given pixel’s estimated value is calculated by taking a mean of the values of all pixels that have similar gaussian neighbourhoods to that pixel, in other words it does not restrict itself solely to the neighbourhood of the pixel but uses the neighbourhoods of similar pixels elsewhere in the image.

We are given some noisy image *v* which consists of *I* pixels. Our algorithm works by evaluating every single pixel *i* in *I.* For each I in I we calculate some value NL[v](i) and we reconstruct our denoised image using this value as we go along.

D2 – discussion of the implementation issues and algorithmic efficiency … read and reference paper [1] and [2] … provide references from other literature too.

D3 – description of the influence of the algorithmic parameters on the output, give examples created form the images and code provided, reference the literature and independent sources as well.

D4 – discussion of the strengths and limitations, illustrated by examples using the images and code provided, reference the literature and independent sources as well.

D5 – description and discussion of modifications to the main algorithm … supported by independent research.

D6 – description and discussion of the applications of the algorithm … supported by independent research.