EEE 508 : PROJECT 2 – PROJECT REPORT

NAME: SREEKANTH GANDAVARAPU

ASU ID : 1222557427

The main idea of the project is to understand how the edge enhancing filter masks work (like Robert Operator, Prewitt, Sobel etc.,) and the impact of change in values of Threshold, L_b (Background) and L_g (Grey -Level of the edge). As per question, I took Robert Operator mask and changed the values of threshold, L_g and L_b, to get various filtered images (or edge enhanced images to be precise). Five gradient images of the input image, "airplane_grayscale.png" are generated as per question. The first image is just the input image that can act as a reference, so that the changes due to various techniques can be noticed. The details of rest of the 5 images are discussed below. The entire report is based on the description given in class notes, in which f(x,y) is referred as input image, G[f(x,y)] is referred as the gradient convolved masked image.

(1) Figure 2: Robert's gradient convolution Mask is used as per the definition given in class notes. The horizontal and vertical components are filtered as per the masking technique and then square root of sum of its squares is obtained as the filtered image at each value. This generated the edge enhanced image produced in figure 2 and is labelled as per the implementation. It can be seen that the smooth regions appear dark, and we can see the sharp edges. After this step we can clearly see the shape of the airplane without any distractions from the background.

(2) Figure 3: The threshold value is set to 25 (as the range is 0 to 255). Each value of the output image is compared with the threshold. If the value is greater than threshold it is replaced with Filtered image(G[f(x,y)] obtained in Figure 2. If the value of the input image is not greater than the threshold it is left with f(x,y) or the input image itself. The edges are emphasized without destroying the smooth background. This looks a bit unclear but the focus here is to improve the sharp edges so that they can be seen more clearly.

(3) Figure 4: The threshold value is set to 25 (as the range is 0 to 255). Each value of the output image is compared with the threshold. If the value is greater than threshold it is replaced with L_g(which is set to 255). If the value of the input image is not greater than the threshold it is left with f(x,y) or the input image itself. This is done to make the edges standout and make easier to identify that this is the edge. Since the background is original image the edges it is not as clearly distinct as a black background.

(4) Figure 5: The threshold value is set to 100 (as the range is 0 to 255). Each value of the output image is compared with the threshold. L_b is set to 0 in this technique. If the value is greater than threshold it is replaced with Filtered image(G(f(x,y)) obtained in Figure 2. If the value of the input image is not greater than the threshold it is left with zero (L_b). This is done so that all the background points are removed and only the edges are visible (this can be enhanced further, which is done in the next step).

(5) Figure 6: The threshold value is set to 25 (as the range is 0 to 255). Each value of the output image is compared with the threshold. L_b is set to 0 and L_g is set to 255 in this technique. If the value is greater than threshold it is replaced with L_g. If the value of the input image is not greater than the threshold it is replaced with L_b. Now, we can clearly see the whole aircraft and boundaries of the mountains very clearly.

In conclusion, we can understand that changing the values of threshold, desired grey level of the edges and background for a rightly applied gradient image mask, we can obtain the edge enhanced image as per our requirement.