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CMP3108M Image Processing Assessment Item 1

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1 Task 1 – Pre-processing Image

Task 1 consists of multiple operations of pre-processing the image. Initially, the enhancement technique used was histogram equalisation, where the intensity values are transformed so that the number of values in each bin in the histogram is approximately the same. This method was not very effective as the shadows around the edges of the image proved difficult, this made some items around the edges hard to see clearly. When binarized it could not detect some objects, so it was not used. The function 'imadjust' was used; it saturates the bottom 1% and top 1% of all pixel values, making the washers and screws darker than the background (except one washer in the bottom right of the image), so they were distinguishable when binarizing the image. Another function 'imsharpen' was used with the parameters of 'radius = 1' and 'amount=1', this is where the contrast along the edges where different colours meet, such as edges of objects, is increased, allowing for more distinct edges in the image which makes it better for edge detection operators in the later tasks, but can introduce image noise if the amount is too high. Even with the 'amount' parameter set to 1, slight image noise is introduced when binarizing the image (Figure 5) but can be removed with morphological operations.

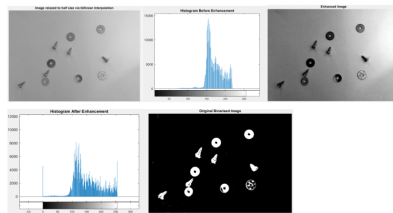


Figure 1-5 – Re-sized image (Top Left), Histogram before enhancement (Top Middle), Enhanced image (Top Right), Histogram after enhancement (Bottom Left) and Binarized Image (Bottom Middle).

2 Task 2 – Edge Detection

The 'sobel' algorithm was used for edge detection of the objects. Several different algorithms such as 'canny', 'prewitt' and 'roberts' were also tested. The 'canny' edge detector picked up too much visual noise from the sharpening enhancement technique and the lighting of the image, so it performed poorly. The enhancement technique could have been changed to

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