**REPORT 1**

In this report, digital image pre-processing methods are mentioned such as binary image conversion, gray scale image conversion, erosion, dilation are discussed.

**INTRODUCTION**

Digital image pre-processing methods is very crucial for image enhancement. Therefore, before process an image, the image should be ready for next steps. It is important and necessary step to process image properly.

**Gray Scale Image Conversion**

There are 3 channels in a color image. These are red (R), green(G) and blue(B) channels. For RGB color lights are added together in varying proportions to produce an extensive range of colors. Assuming that a channel consists of gray levels ranging from 0 to 255, we can say that an RGB image consists of the combination of three gray level images ranging from 0 to 255.

In this application, RGB color image is converted gray scale image using the formula below:

gray = intensities(1)\*im(:,:,1) + intensities(2)\*im(:,:,2) + intensities(3)\*im(:,:,3);

**Binary Image Conversion**

In order to convert a gray scale image to binary image, a convenient threshold value should be specified. This is a key role of binary conversion. To an image ranging from 0 to 255, average value of gray level is 128. In this application it is proper value for threshold but in practice it is not a good value mostly. In order to obtain convenient value of threshold, the histogram graph must be observed and then a threshold value must be specified. A more suitable method is Otsu’s method. It basically depends on variance changing of two class.

**Erosion**

An erosion basically consists of structuring element and image convolution with this structuring element steps. Structuring element basically is like a kernel, filter or mask. This structuring element can be disk-shaped, square-shaped or many others. Erosion causes poor details in an image to be destroyed. It performs this process according to the following procedure.

Let be a Euclidean space or an integer grid, and  a binary image in . The erosion of the binary image  by the structuring element  is defined by:



**Dilation**

It can be said that dilation is the reverse of erosion process. It can be stated as follows:



 is symmetric of 