Binary Conversion of image

Main steps involved in conversion of colored image to binary image is described in the arrow image. A 3-Channel RGB image of the specimen is captured from camera. Then it is converted to the single channel greyscale image. In the colored image each pixel store three values between 0(darkest, considered as black) to 255(white) corresponding to primary colors red, blue and green which together produce color of that pixel(so it can't be directly converted to binary ). While in greyscale image each pixel stores only one value which carries intensity information between 0 to 255 .Greyscale image is converted into the binary by selecting intensity of light suitable for the experiment. Binary image can be represented as a matrix where each pixel can have value either value 0(black) or 1(white).This binary image is our Output-I as shown in figure.

Image Filtration and Centroid Extraction

Now we have binary image as our output-I. On the binary image we have applied blob detection method. For blob detection we have used cvBlob library in OpenCV. It is a library for image processing which is aimed to detect the connected regions in the binary image and those connected regions are termed as Blobs . Further, from this library we have access to the different properties of the connected regions like area, orientation, centroid etc. After detecting the connected region in binary image(output-I) we have extracted area of the each blob in pixels square. Background of the image is then filtered on the basis of the extracted area (Blobs having very larger or smaller area in comparison to marker was subtracted from the background).An image (figure-) obtained having blobs size comparable to the markers. Remaining blobs (apart from markers) are then filtered on the basis of their centroid as shown in figure. From this figure we have obtained the x-coordinates and y-coordinates of the centroid of each marker. Then we have sorted these coordinates according to x-coordinate using bubble sort. These sorted coordinates are our Output-II.

Strain Measurement

For Strain Measurement we have captured images before and after deflection. As shown in figure-(flowchart) we have repeated process described in 3.1(conversion to binary) and 3.2 (image filtration and Centroid Extraction) for both the Images. From these processes we have extracted the Output-II (i.e. sorted coordinates).Now we have obtained the relative displacement between the corresponding marks by comparing the output-II of both image in pixels. The pattern that was pasted on the beam have the black squares having fixed center to center distance. The fixed distance was mapped with the difference in the pixel value of two consecutive x-coordinate values in output-II. Using this mapping we found the deflection in y direction.