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Blood Cell Counting and Disease detection from image using PCNN

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ABSTRACT: Image processing is also helpful in health care industry. Blood vessel is an important work in our body. In the Blood vessel system different blood cells are available such as RBC(Red Blood Cell),WBC(White Blood Cell),Platelets.. In any blood test, counting of different blood cell is an important for any patient. The proposed system reducing time of cell counting and finding the disease using PCNN algorithm. PCNN (Pulse Coupled neural Network) is using for image denoising , pattern recognition etc. PCNN algorithm is used if the same gray value of the pixel in image processing is easily classified so, this system will be helpful for pathologist. This system provide an user friendly software that allows quick user interaction with a simple tool for counting RBC and WBC from a given image. The counting result is used to determine the capability or deficiency of the body system.

KEYWORDS: PCNN, noise removal, image segmentation, cell segmentation , cell counting.

I. INTRODUCTION

In the medical test RBC and WBC count will be an important factor. RBC is also called as Erythrocyte and WBC is called Leucocyte. The blood cell are very important factor in our body because RBC used for transportation of oxygen and WBC is also used for protection or fight from germs, viruses. PCNN(Pulse Coupled Neural Network) is two-dimensional network which is composed by $M \times N$ PCNs(pulsed coupled neural).[1]

The basic model of PCNN consists of three parts that form a neuron: Dendritic tree, Linking modulation, Pulse generator. The problem of overlapping cell will be solve with the help of PCNN model. Basically elimination of disturbing object successful in a blood cell . The PCNN used in image understanding applications is a single-layer network in which every neuron is corresponding to a pixel in the image. When a neuron fires at first, it begins to communicate with its neighbours and encourages its nearest neighbours to fire in the way that is supported through interconnections .

II. LITERATURE SURVEY

In [2] an automated method for counting red blood cells present in a blood sample. The proposed method addresses the problems of holes present in blood cells and overlapping characteristics of the red blood cells. The procedure is quite simple and straightforward, which utilizes mathematical morphological operations of erosion and dilation for performing different steps. In [3] NDA(New Detection Algorithm) detect almost all white blood cells, and the contour of each detected cell is nearly complete. Its adaptability is strong and the running speed is expected to be comparatively high due to the easy hardware implementation of FCN(Fuzzy Cellular Neural Networks).In [4] proposes combination of PCNN and template matching algorithm to segment and count overlapped red blood cells image. The area of isolated red blood cell is considered as a template. Proposed algorithm performs better on overlapped red blood cells images in comparison with an existing system. In[5] a novel watershed-based method for segmentation of cervical and breast cell images. They formulate the segmentation of clustered nuclei as an optimization problem. A hypothesis concerning the

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nuclei, which involves a priori knowledge with respect to the shape of nuclei, is tested to solve the optimization problem.

III. METHODS AND TECHNIQUES USED

1) Image Segmentation:

Image segmentation is the process of division of a digital image into multiple segments. The main goal of segmentation is to simplify and/or change the representation of an image into more meaningful and easier to analyse. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images.

2) Noise Removal:-

A) In image small dots are visible which is salt and pepper noise . While counting even these will be considered as one object and hence giving wrong result by increasing total count. To avoid this we use 'bwareopen' command which removes object of specific area.

B) Disturbed objects Removal:- If we set PCNN parameters appropriately, we can remove small disturbed objects successfully, so it is feasible to eliminate black spots effectively shown.

3) Cell Counting:-

Scan every pixel such that first row is scanned first then second and so on. Whenever it finds white pixel it label that pixel. If that pixel is the neighbour of already scanned pixel then whatever the label is given to its neighbour, same label is given to that pixel. Every time when new pixel is found which is not the neighbour of already scanned pixel then label count is increased by 1 and assigned to it.

IV. PROPOSED SYSTEM

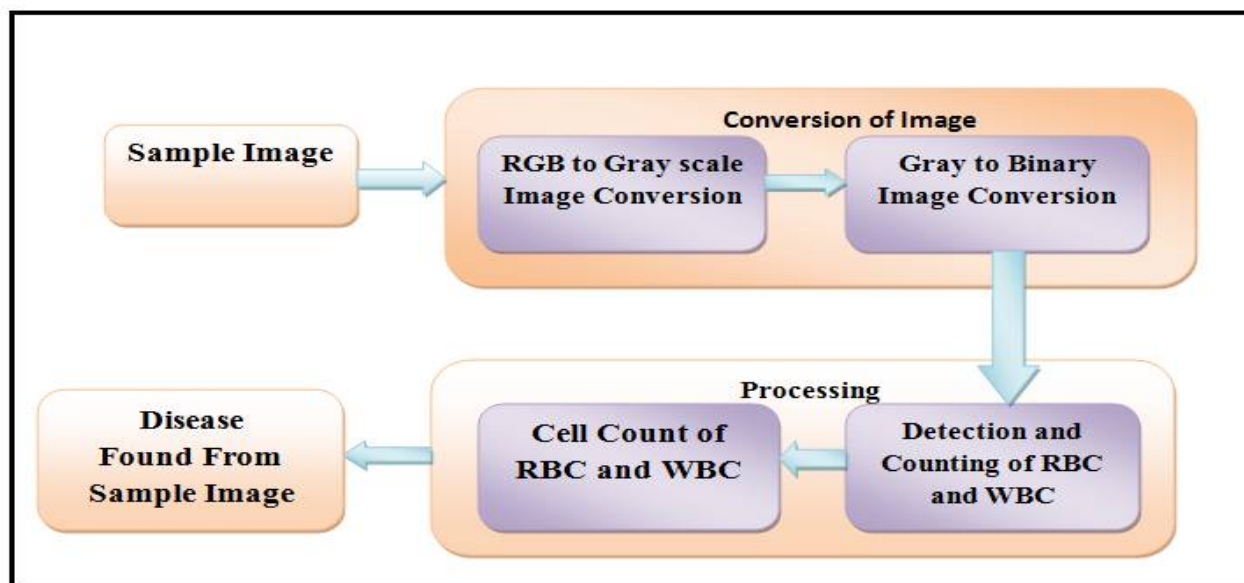


FIG. SYSTEM ARCHITECTURE

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1. Sample Image:-

Sample image should be taken by laboratory. It may be used as the input image for the application.

2. RGB to gray scale Image Conversion:-

It process on image to convert into digital image. Digital image is in RGB(Red Green Blue) color then this image is converted into gray scale image.

a)High Pass Filter:-

High Pass Filter is to detection of change n intensity of the gray levels inside and outside the cell and the background of these image.

b)Canny Edge Detection:-

The high pass filtered image is passed through the canny edge detection algorithm for detecting the edges of cell and it should avoid the false edges.

3. Gray scale image converted into Binary Image:-

Canny edge detection method detect all edges then all circular and non-circular edges are clearly mapped which help to separate one cell from another then this image convert into binary Image.

4. Detection and Counting of WBC and RBC:-

a)Detection:

- 1) The circular transform is applied to the adjust in image.
- 2) This transform search for blood cell in image and detect them.
- 3) The function draw circle to draw circle around the detected cell.
- 4) Overlapping circle are detected.

b) Counting :

The count of blood cell from the image is an averaged interpolated to the final count of the RBC's present in 1 cubic centimetre volume of blood . PCNN algorithm used for detecting the blood cell from the sample image.



Fig. Original image of blood cell

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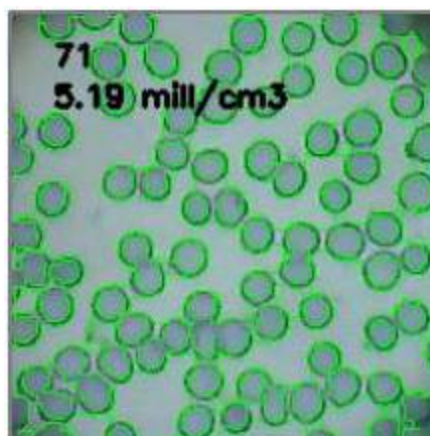


Fig. Marking and counting of cells image

4. Cell count of RBC and WBC :-

By using following formula RBC and WBC can be calculated:-

a) Formula for Counting RBC's:-

$$N=C/A*100000$$

b) Formula for Counting WBC's:-

$$N=C*3000$$

5. Disease Found from sample image:-

It calculating WBC and RBC cells count and as a cell count is increase or decrease then it decide the disease of given sample image.

V. CONCLUSION AND FUTURE WORK

In this system PCNN method can separate overlapping cells easily. We conclude that cell counting is fast, cost effective. In future work, we will improve the template matching approach and find a more efficient and accurate way to count overlapping cells.

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