A Comprehensive Review of Analysis of Counting Blood Cells Using Different Image Processing Algorithms

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ABSTRACT : *Identification of blood disorders is through visual inspection of microscopic images of blood cells, from the identification of blood disorders, it can lead the classification of certain diseases related to blood. This paper describes a preliminary study of developing a detection and measurement of white blood cells and red blood cell using microscopic blood sample images. Analyzing through images is very important as from images; diseases can be detected and diagnosed at earlier stage. Further actions like controlling, monitoring and prevention of diseases can be done. Blood cell counting by laboratory task utilizes hemocytometer and microscope. Images are used as they are cheap and do not require expensive testing and lab equipments. This paper will focus on white blood cells and red blood cells.*

KEYWORDS : *MATLAB, Image segmentation, Red blood cells, Blood cells, Feature extraction.*

I. INTRODUCTION

Blood cell segmentation and identification is a vital in the study of blood as a health indicator. A complete blood count is used to determine the state of a person's health based on the contents of the blood in particular white blood cells and the red blood cells. The main problem arises when massive amounts of blood samples are required to be processed by the haematologist or Medical Laboratory Technicians. The time and skill required for the task limits the speed and accuracy with which the blood sample can be processed. This task will aim to provide user-friendly software based on MATLAB allowing for quick user interaction with a simple tool for the segmentation and identification of red and white blood cells from a provided image.

Medical Imaging:

Medical Imaging is the visualization of body parts, tissues and organs, for use in clinical diagnosis, treatment and disease monitoring. Imaging techniques encompass the fields of radiology, nuclear medicine and optical imaging and image-guided intervention.

Red Blood Cells

Red blood cells carry oxygen from a person's lungs to the rest of their body. A depletion of red blood cells may lead to anemia. Anemia results in dizziness, fatigue, or even more serious symptoms if it remains untreated. The red blood cell count determines the total number of red cells in a sample of blood. The red cells, the most numerous of the cellular elements, carry oxygen from the lungs to the body's tissues.
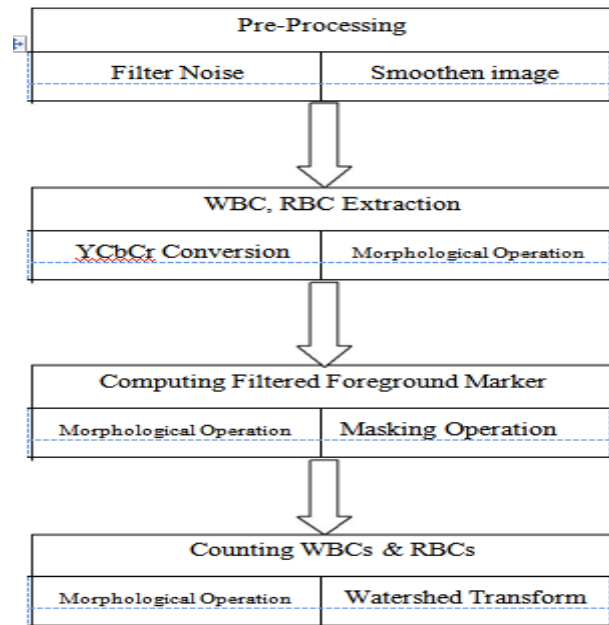
White Blood Cells

White blood cells contain the immune cells that attack and remove viruses and bacteria in a person's body. Low WBC counts may indicate that a person is in danger of infection. High WBC counts might indicate an existing infection, tissue damage, or leukemia.
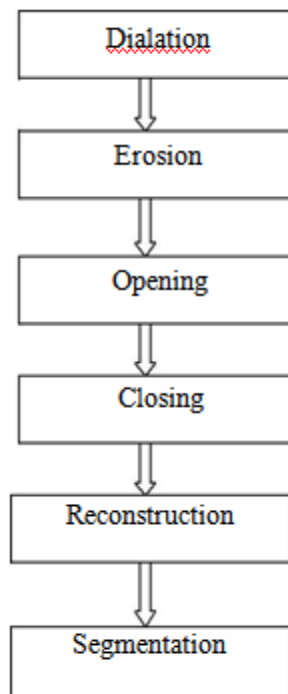
II. METHODOLOGY

Watershed Transform:

The watershed transform can be classified as a region-based segmentation approach. The intuitive idea underlying this method comes from geography: it is that of a landscape or topographic relief which is flooded by water, watersheds being the divide lines of the domains of attraction of rain falling over the region.

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│              Pre-Processing                   │
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│     Filter Noise       │    Smoothen image     │
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┌─────────────────────────────────────────────┐
│            WBC, RBC Extraction                │
├───────────────────────┬───────────────────────┤
│   YCbCr Conversion     │ Morphological Operation│
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                        ↓
┌─────────────────────────────────────────────┐
│     Computing Filtered Foreground Marker      │
├───────────────────────┬───────────────────────┤
│ Morphological Operation│   Masking Operation   │
└───────────────────────┴───────────────────────┘
                        ↓
┌─────────────────────────────────────────────┐
│            Counting WBCs & RBCs               │
├───────────────────────┬───────────────────────┤
│ Morphological Operation│  Watershed Transform  │
└───────────────────────┴───────────────────────┘
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Morphological Image Processing

Morphology is a wide set of image processing operations that process images based on shapes. Morphological operations apply a structuring element to an input image, creating an output image of the same size. In a morphological operation, the value of pixels in the output image is based on a comparison of the corresponding pixels in the input image with its neighbours. The number of pixels added or removed from the objects in an image depends on the size and shape of the structuring element used to process the image.

Block Diagram

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┌──────────────────────┐
│       Erosion         │
└──────────────────────┘
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┌──────────────────────┐
│       Opening         │
└──────────────────────┘
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┌──────────────────────┐
│       Closing         │
└──────────────────────┘
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┌──────────────────────┐
│    Reconstruction     │
└──────────────────────┘
           ↓
┌──────────────────────┐
│     Segmentation      │
└──────────────────────┘
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III. CONCLUSION

The paper has presented the image processing approach to the recognition and classification of the blood cells. The most important points of this approach are: Different features of cells are then extracted from the labelled image. From these features, database is created and with the help of this database, set of test images and watershed technique, classification of various cells in an image has done.

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