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DETECTION OF MALARIA PARASITE USING IMAGE PROCESSING

Akshay Y. Randive[1],Amit D. Salunkhe [2],Nikhil R. Rajmane [3,],Amit P. Kadam[4]

[1, 2,3,4]*Department of Computer Science & Engineering, D.I.E.T Sajjangad Satara, Maharashtra India*

Abstract - *Malaria, a disease that is caused due to female mosquito bites which comes under the plasmodium category. Detection of malaria is generally done on a microscopic examination of blood sample of the patient. This method takes time to examine the sample and also a pathologist doctor is needed to examine the sample. The intention of this paper is to introducing quick and precise method to identify and detect the malaria parasites using the image processing domain. The blood sample of the patient is taken through a microscope using a camera, for a microscopic image of the sample. Then after performing various image processing operations, the result is generated, either positive or negative to malaria. In rural areas, there are possibly less pathologist and experts available, this approach can be used to facilitate the detection of malaria without the need of a pathologist.*

Keywords-*Malaria parasite detection, image processing, positive-Negative malaria cells,*

I. INTRODUCTION

It is possible to precisely detect this virus using a image processing approach. According to the World Health Organization (WHO), it causes more than 1 million deaths arising from approximately 300–500 million infections every year. Detection of malaria is done widely using the standard detection method that is examining the sample by an expert or pathologist, we can't deny the fact that ,in rural areas where there could be lack of pathologists and experts, where detection of this disease is not possible.

It was necessary to create an automated system that could detect malaria, we developed an algorithm tailored to analyses and detect the pattern of this virus. Another significant use of this system is to create an complete automated system that has a microscope, camera, and a processing unit and slide changing, adjusting mechanism attached to it, which can take a bulk of slides, that are suspected to be malaria, The system can processes all the slides and generate results fast and precise results than human experts. This approach can be used to detect other diseases as well using image processing domain, this is one of the future scope of this paper.

II. Literature Survey

The literature review summarizes all the relevant literature researched during the course of this project. It presents certain approaches used by many researchers for classification. It also compares the performance of all classifier with other common classifier with same parameters. Finally the best parameters and classifier combination is discussed.

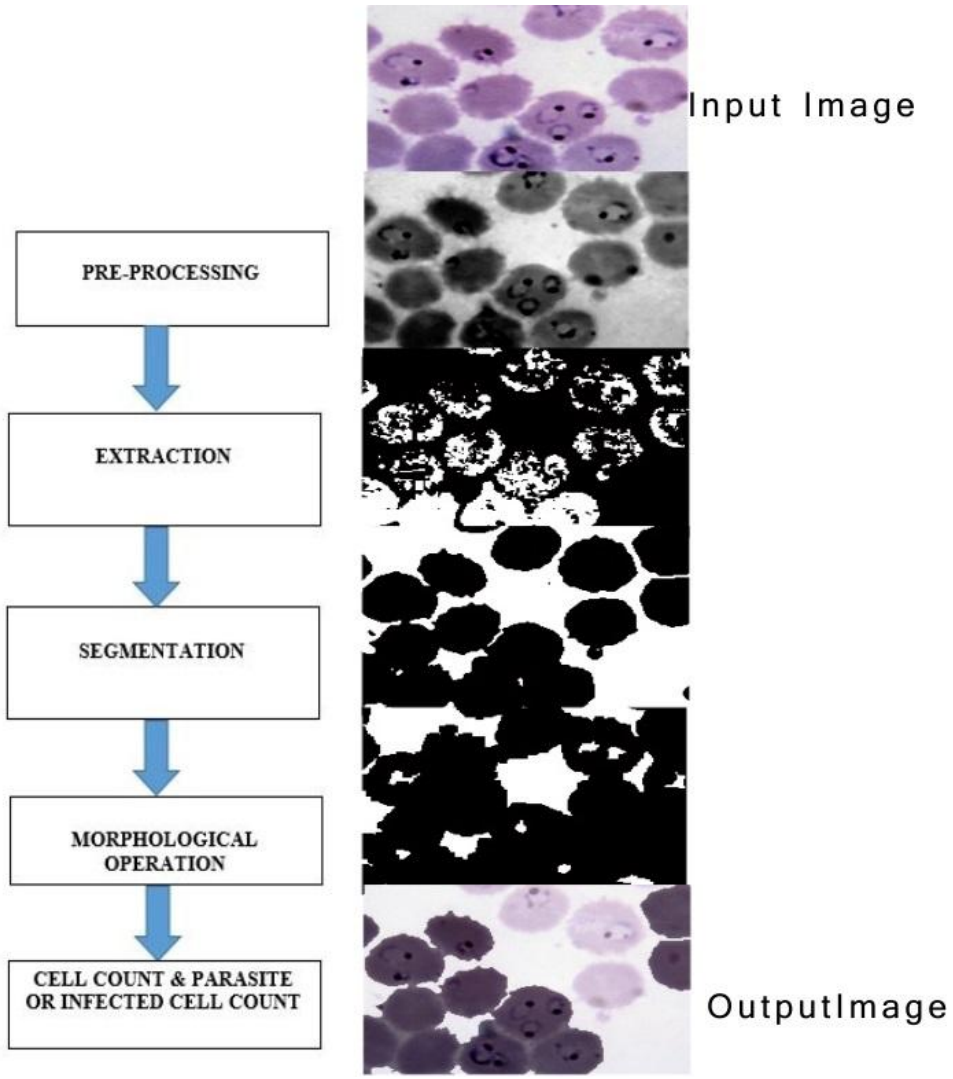
1) F. B. Tek, A. G. Dempster, and I. Kale, "Computer vision for microscopy diagnosis of malaria," Malaria Journal 2009. Illustrate a technique for identifying the malaria for blood cell images. It involves the counting of Blood cell using an adaptive OTSU thresholding technique. Which use to segment the image and separate the RBC and WBC for Counting? The paper also considers the area of cells to declare severity. The paper uses SVM as Classifier for declaring the result of whether the patient is affected by Malaria or Not. The proposed automated method of segmentation and classification of cell is simple.

2) Andrew G Dempster, Izzet kale and F.Boray Tek: "computer vision for microscopy diagnosis of malaria". An approach is proposed to detect red blood cells with consecutive classification into parasite infected and normal cells for estimation of parasitemia. The extraction of red blood cells achieves a reliable performance and the actual classification of infected cells. Sensitivity of system is 93.12%, and Specificity is 93.17%. Shape based and statistical features are generated for classification. The features are selected for recognition of two classes only. This approach leads to the high specialization of each classifier and results in an overall increase in accuracy.

3) S. S. Savkare, S. P. Narote "Automatic Detection of Malaria Parasites for Estimating Parasitemia" ICASSP 2009. In order to evaluate the parasitemia of the blood. To detect the red blood cells that are infected by malarial parasites, statistical based approach is used. To separate automatically the parasites (trophozoites, schizonts and gametocytes) from the rest of an infected blood image, color, shape and size information are used and later the image is compared with infected images after transformation of image by scaling, shaping to reconstruct the image. The images returned are statistically analyzed and compare to generate a mathematical base. Also the evaluation of the size and shape of the nuclei of the parasite is also considered.

III. Methodology

We have developed a complete system equipped with functions to perform 1)Pre-processing 2)Extraction 3)Segmentation 4)Morphological operations 5)Cell count and parasite cell counting as depicted in fig [1] below.



Fig[a] Fig [b]
Fig[1]SystemArchitectureFlowchart

3.1)Pre-processing:- The Pre-processing includes image acquisition which is a raw image from the microscope using a camera and supplied to the image processing module. In the module Initially the raw image is used to generate a grey scaled image altering the RGB of the image.
The presence of noise is eliminated and a histogram view is generated altering the color intensity.

3.2)Extraction:- In the next step again the raw image is taken as input , and the intensity is increased, Also it is necessary to reduce the blue layer in the image, This process is called as extraction 1. Another type of extraction is Extraction 2 ,where the output of Extraction 1 is taken as input and this is used to remove the purple layer in the image. The extraction 1 & 2 are used for further processing in further methodologies.

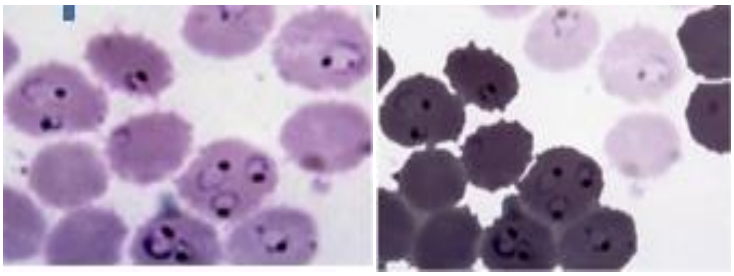
3.3)Segmentation:-The output of extraction 2 is used for segmentation, The segmentation uses a technique in which it removes the unneeded from the image, Specifically the area around 100 pixels or less is likely to be an unwanted debris(Noise)that is useless is eliminated. Then the initially created binary image and the image with noise removal ,Both are used for adjusting the intensity level of the image which gives us a binary image (Black & white image).

3.4)Morphological operation:- Further the Binary image is used as input for techniques such as thresholding & Sobel filtering which is used to sharpen the edges of the cells. This processing is done on a 2d image. Furthermore the

Technique called First factor is used to increase the grey masking by 0.5units to fill the holes in the cells, Moreover to detect the edges of the cells and detect holes the Gradient masking method is used, and for increasing the edge thickness of the cell and making it bolder for ease of operation the method of dilation is used and hole filling is used for Result that specifies the RBC count in image.

3.5)Infected cells and Result:-Adaptive histogram uses the initially created greysaled image which is used to generate an overlay 1 which makes the cell edge green and overlay 2 for making the area around the cell green, this is used to efficiently track the shape of the virus, which gives us the total infected cells. And finally the result is generated in the form of either positive or negative format.

IV. Result and discussion



Fig[2] Raw-image Fig[3] Result

This sample of a patient is a positive plasmodium vivax sample. It consists of an elongated and large cell size with a Dot and a ring inside the cell.
The result holds a significant value of positivity on the basis of the black dots which represents the plasmodium. vivax. virus in fig [3]
It shows areas that the algorithm believes to be infected with malaria in black. As clearly seen, the algorithm is quite effective in picking out areas infected with malarial parasites and highlighting them in black.

VI. Conclusion

In our project, we try to implement a method to identify and detect the malaria parasites using the image processing domain, the algorithm shows the areas where it believes to be infected with malaria in black, as seen in Fig[2] & Fig[3] the algorithm is quite effective in picking out areas infected with malarial parasites and highlighting then in black.

VII. References

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