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Maleria Parasite Detection using Microscopic Images of Blood Smears

Vivek Nagargoje[1], Ashish Halle[2], Ujjawala Bhor[3], Vaibhav Survase[4], Shubhangi Mahajan[5]

Professor, Information Technology, NMIET, Pune, India[1]

Student, Information Technology, NMIET, Pune, India[2,3,4,5]

Abstract: Malaria is a very extreme infectious disease caused by the genus Plasmodium peripheral blood parasite. Occasionally, traditional microscopy, which is now "the gold standard" for the diagnosis of malaria, has proven ineffective as it requires time and findings are difficult to replicate. Automation of the assessment process is of high significance because it presents a significant global health concern. In this work, an accurate, quick and affordable malaria diagnosis model was established using stained thin blood smear images. A collection of intensity-based features was suggested and the performance of these features was assessed using an neural network classifier on the red blood cell samples from the generated database.

Keywords: malaria disease, pre-processing, classifier algorithm, feature extraction, Convolutional Neural Network (CNN) etc.

I. INTRODUCTION

Malaria is a mosquito-borne blood disease caused by parasites of the genus Plasmodium. Conventional Diagnostic tool for malaria is the examination of stained blood cell of patient in microscope. The blood to be tested is placed in a slide and is observed under a microscope to count the number of infected RBC by a trained microscopic. An expert technician is involved in the examination of the slide with intense visual and mental concentration. This is tiresome and time consuming process and lacks accuracy. Here, we construct a new automated system for detection of parasites in blood smear using Image Processing and CNN. Malaria is a very extreme infectious disease caused by the genus Plasmodium peripheral blood parasite. According to figures from the World Health Organization, there were an estimated 262 million cases of malaria worldwide in 2000, resulting in 839,000 deaths.

II. OBJECTIVES

Prepare Dataset of images which will be required to develop our system. Predict Malaria using CNN.Comparative result analysis of existing solutions and proposed solution. To develop a fully automated system to positively identify malaria parasites present in blood smears.The algorithm generated will be helpful in the area where the expert in microscopic analysis may not be neededThe effort of the system is to detect presence of parasite at any stage.

III. LITERATURE SURVEY

[1] Malaria Parasite Concentration Determination Using Digital Image Processing
Author: Bhaiyya D. Ghanmode
An expert manually detects the malaria parasite by inspecting each and every slide. Malaria parasites are divided into five groups, each of which is responsible for a portion of the world's malaria cases. The paper demonstrates that using the malaria parasite as a traditional norm will lead to human error.

[2] “Enumeration of Plasmodium Parasites on Thin Blood Smear Digital Microscopic Images ”
Author: Alifia Revan Prananda, Hanung Adi Nugroho*,
One of the problems in the area of computer vision and medicine is automatic parasite detection. In order to assist the parasitologist in detecting parasites, an automated detection system has recently become mandatory. The invention of automatic parasite detection, on the other hand, was fraught with difficulties.

[3] “Detection of Malaria Parasites Using Digital Image Processing”
Author: Ahmedelmubarak Bashir1, Zeinab A.Mustafa2

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Using microscopic colour images, processing is used to identify malaria parasites. Based on strength and texture characteristics, an effective method for parasite detection is suggested. The primary feature of this semi-automated diagnosis is to identify parasites.

IV. EXISTING SYSTEMS & PROPOSED SYSTEMS

A. *Existing Systems*

- Malaria Is A Curable Disease If The Patients Have Access To Early Diagnosis And Prompt Treatment.
- Antigen-based Rapid Diagnostic Tests (Rdts) Have An Important Role At The Periphery Of Health Services Capability Because None Of The Rural Clinics Has The Ability To Diagnose Malaria On-site Due To A Lack Of Microscopes And Trained Technicians To Evaluate Blood Films.
- Methods Used To Detect Malaria Include Microscopic Detection Of Infected Cells In A Laboratory. The Study Proposes An Image Processing Model For Detection Of Malaria Infected Cells. Using Image Processing Techniques To Detect Parasite-infected Red Blood Cells In Thin Smears On Standard Microscope Slides
- The Most Widely Used Present Day Method Is Examining Thin Blood Smears Under A Microscope And Visually Searching For Infected Cells.

B. *Proposed systems*

- We are developing an Automated System For Detection of Malaria Parasite using Image Processing and CNN to overcome all the limitations of the existing solutions which are :
  1.) Time Consuming process
  2.) Lack of Accuracy
  3.) Delay in diagnosis
  4.) Lack of solution for dealing with large no of samples
- Our Solution overcomes all these limitations and provides a better accuracy rate than the existing system.

C. *Need*

- The chances of false detection due to human errors are very high which turns out in wrong results and turn in fatal conditions.So system focuses on curbing down the human errors of detecting the presence of malaria parasite in the blood sample by using image processing and automation.
- Digital image processing is its ability to carry out the diagnosis in less time, providing high quality of sensitivity and also reduces cases of false negativity.
- The efficiency of these techniques depends on factors like quality of microscope and images.
- Provides a more reliable and standardized interpretation of blood film images and allows more patients to be served by reducing the workload of the malaria field workers, and it can reduce diagnostic costs.

V. CONCLUSION

A parasite detection method has been introduced. The images used in this work were obtained from various sources, then processed the images and extracted some characteristics. The presence of the malaria parasite was then identified using these characteristics. So we designed a very robust system where the result percentage will be highly achieved and the system will be able to classify the infected blood cells.

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