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Detection of Malaria Using Image Processing and Machine Learning

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Abstract: *Malaria is a severe worldwide health issue that requires rapid and accurate diagnosis in order to control the disease. Malaria is easy to treat if discovered early and followed up with correct medical therapy. Computer-aided diagnosis is becoming more prominent since it can be used as a basic screening test in the absence of an expert microbiologist. To automate malaria diagnosis, an image processing algorithm necessary. In order to construct picture characteristics based on colour, texture, and the geometry of the cells and parasites. It incorporates many representations of the data for imaging, image processing, segmentation, and classification of test images.*

Keywords: Malaria, Segmentation, CNN, Machine Learning

I. INTRODUCTION

Malaria is among the most frequent infectious diseases and a severe public health issue around the world. Malaria is caused by cytoplasm protozoan parasites, which are transmitted through the bites of infected females. Anopheles mosquitoes invade red blood cells. In latest days, a plethora of innovative approaches for diagnosing malaria have been developed. The process of automating malaria genus with the advantages has attracted many researchers .the aim of the research is eliminate its serious constraint on the performance of the human operator of diagnosis rate. This is accessed by producing a digital image .

This algorithm designed in such a way an image classify problem, and therefore it takes the form of recognition and classification system. One of the most significant advantages of employing ML is that it does not require the creation of hand-crafted elements, and segmented Red cells are commonly used as inputs for a CNN.CNN was applied to identify among malarial and uninfected red blood cells. The implemented Convolutional Neural Network was made up of a combination of convolutional and dense layers. CNN used to blood smear samples improves accuracy. To identify malaria-infected cells, researchers examined various thresholding procedures.

II. LITERATURE SURVEY

Various technologies are used to detect malaria. Octave Iradukunda et al.[3] proposed The other with percent, 28 seconds cost time, 0.009 Classifications Error, and 98 percent precision revealed the Elm's efficacy in the detection of malaria cells case, and it can also be alluded to by other researchers in the connected field..Sidharth S Prakash et al.[4] proposed the usage of deep learning models in the machine diagnosis process and use a malaria datasets provided by the National Library Lister Hill National Center for Biological Communications, USA. Jane Hung et al. [1] This illustrates that Faster R-CNN surpasses our background and places the findings in the view of human performance..Golnaz Moallem et al.[5] The recommended segmentation technique has been carefully validated on a collection of over 1300 thin smears containing around 1350 WBCs..Ilsa Rameen et al.[2] proposed process starts with prepossessing, in which photos are the feature extraction method Google Net is utilized, and the categorization results show that this method has a 95.8 percent accuracy for detecting malaria in tissue samples.

III. METHODOLOGY

At the moment, spotting Malaria parasites on single cell samples is mainly manual. This process could be improved by taking an image of the blood smear and then using the proposed model to determine whether the cells are contaminated or not. To improve existing systems, the proposed methodology leverages advantage of image processing systems. These

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technologies can reduce the time required for malaria parasite detection in blood testing. Methodologies for segmentation include edge detection, watershed segmentation, and morphological segmentation.

IV ALGORITHM

Step 1: Provide the input as image
If true go to step 2
Else go to step 1
Step2: Analyse the given input image.
Step3: Analyse image segmentation in three techniques

- Watershed segmentation
- Threshold segmentation
- Edge segmentation

Step 4: Classifying the images infected or not

V. FLOWCHART

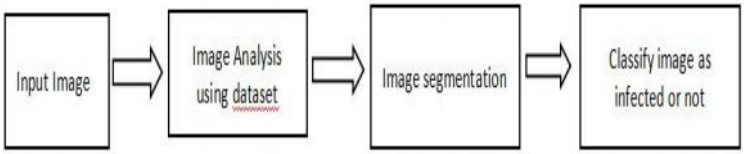

Figure 1: Block Diagram of workflow

Malaria is a disease that comes from female anopheles mosquitoes. malaria can also be transmitted to the child during the pregnancy of mother through blood during childbirth. In this proposed method using CNN(Convolutional Neural Network) it detects malaria by giving input image and that image is analyzed using the datasaet which contains images of RBC cells which are infected and non infected by inserting that image it is segmented by three different techniques, watershed segmentation, threshold segmentation, edge based segmentation based on that it will classify that particular image that infected or not.

Classifier	Accuracy Rate %	Time used in seconds
RF	95.5	947
VGG16	96.6	1346
RESNET	96.9	1328
Proposed work(CNN)	96.8	1250

Table 1: Model Accuracy and Time Take

VI. RESULT

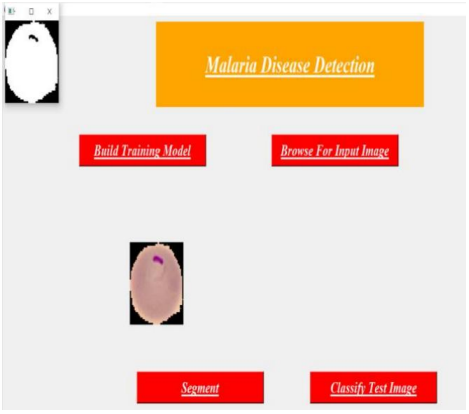

Figure 2: result of threshold segmentation

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Figure 3: result of watershed segmentation

Figure 4: result of edge detection

VII .CONCULSION

In this presented a methodology and developed algorithm for identifying malaria, automated malaria detection, and quantify of malaria infection. In fact, we devised a machine learning training strategy that can detect malaria with other types of parasites. Also, examine how to strengthen the predictive value of the data.In this proposed method the accuracy rate is 96.8% .

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