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Review On Malaria Parasite Detection Using Image Processing Techniques

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Abstract — *Malaria is an extremely infectious disease cause due to blood parasite of genus plasmodium. Malaria is a terrible disease in the hematological region causing millions of mortality; hence the fast diagnosing is the extreme requirement of era. Conventional microscopy, which is presently "the gold Standard" for malaria detection has occasionally proved ineffective as it takes lots of time and outcomes are complicated to reproduce. Since it poses a global health problem, automation of the evaluation method is of high significance. An image processing system is able to enhance outcomes of detection of malaria parasite cell. A variety of image processing techniques are used in the proposed method. The method proceeds in steps like image transformation, classification and feature extraction. This method assists to reduce time as well as afford the accuracy to detect malaria to certain extent.*

Keywords-*Malaria; Parasite detection; image processing; feature extraction; classification.*

I. INTRODUCTION

Malaria is one of most widespread transmittable diseases and a vast society health crisis. Malaria is serious parasite disease and important cause of death common in humid and subtropical climate of area. According to World Health Organization (WHO), malaria is probable to occur in around 3.3 billion cases. Malaria is a critical disease spread via mosquitoes. The major cause behind malaria is a parasite called Plasmodium that infects female anopheles mosquitoes. To get infected it takes only single for you, and if unprocessed, it can be serious. Infected individual shows various medical manifestations from mild to serious ones that may cause to death. Malaria is a serious worldwide disease; if it has been not treated or detected from the initial stage it could be more critical or sometime may lead to death. The parasites passing via a complicated life cycle within the human body, using the red blood cells as hosts.

There are lots of methods to detect malaria, among them manual microscopy is considered to be "the gold standard". However because of the various steps essential in manual estimation, this diagnostic technique takes too much time. Malaria infections are detected manually by pathologists who observe the microscopic images of strained blood records on glass slides and calculate the contaminated blood cells. If sample size of patient is great, there is always a possibility to detect imprecisely. There is a chance to occur human error, so computer based classification using digital image processing methods gives better outcome than the manual diagnoses of Malaria. Intend of this work is to build up a detection method to correctly detected malaria parasites present in images. In the pre-processing stages digital image processing systems are used to obtain high-quality medical images.

In this paper, Image Processing is used to detect the existence of Malaria Parasite. In the proposed system, various steps are used such as image transformation, feature extraction and image classification.

II. LITERATURE REVIEW

In literature, malaria detection techniques available are described as follows.

D. Ruberto et. al. [4] refers morphological approach for parasites detection in Giemsa marked slides of blood. Distinct objects in blood have been detected with their color and dimension. The parasites are identified through an automatic thresholding on the basis of morphological method, using Granulometrices to calculate RBCs size and parasites nuclei. A segmentation technique with morphological operators combined with the watershed algorithm.

Pallavi T Suradhkar [2] propose is effectively an image classification issue, and therefore takes the form of a standard classification and pattern recognition method. Thresholding, grey scale image conversion, thinning labeling algorithm involves in system design used for malaria parasite detection. Image segmentation techniques and color range are used by it to identify infectious cells present in images obtained from giemsa stained blood samples.

Diaz et al. [1] in his research determines a color segmentation method for division of pixels into three distinct classes: red blood cell, parasite and background, on the basis of standard supervised classification algorithms.

The paper by Silvia Halim *et. al*. [3], designed a system for estimating parasitemia. Template matching approach is used for RBCs detection. Detection of parasites are done by means of the variance based system from grayscale images and next approach is based on color co-occurrence matrix which is on the basis of the individual color index of pixel and color indices of its eight neighboring pixel.

Deepa. A. Kurer et al. [7], designs a new approach for low-level image processing –SUSAN (Smallest Unvalued segment assimilating nucleus) Principle, that performs Edge and Corner detection. Image features depend on the

geometry of the cells, texture and color and generation of parasites takes place, also features which uses a priori knowledge of the classification problem and mimic features used by human technicians.

In [5], the author has discussed feature extraction from given image. According to author, it is essential to remove noise from given image prior to classification. If we take out the noise from image, we can simply extract distinct features of that image.

III. PROPOSED SYSTEM

In the proposed system, we will study how to make malaria detection process automatic. To improve the accuracy of the malaria detection system, we proposed new algorithm which includes two algorithms. One is Haar wavelet algorithm for image transformation and second is K nearest neighbor (KNN) algorithm for image classification. As we are transforming the image before performing classification, our system will show more accurate result.

Main objectives involved in the proposed system are as follows:

- To develop a malaria parasite detection system in which pathology admin will upload patient's scanned RGB report.
- To build up an expert system for patients which includes two types of expert: Pathology expert and Health expert.

The working diagram of proposed system is as shown below. According to the working diagram 1st step of malaria parasite detection is image uploading. If any user wants to perform malaria test, he have to upload blood report as image.

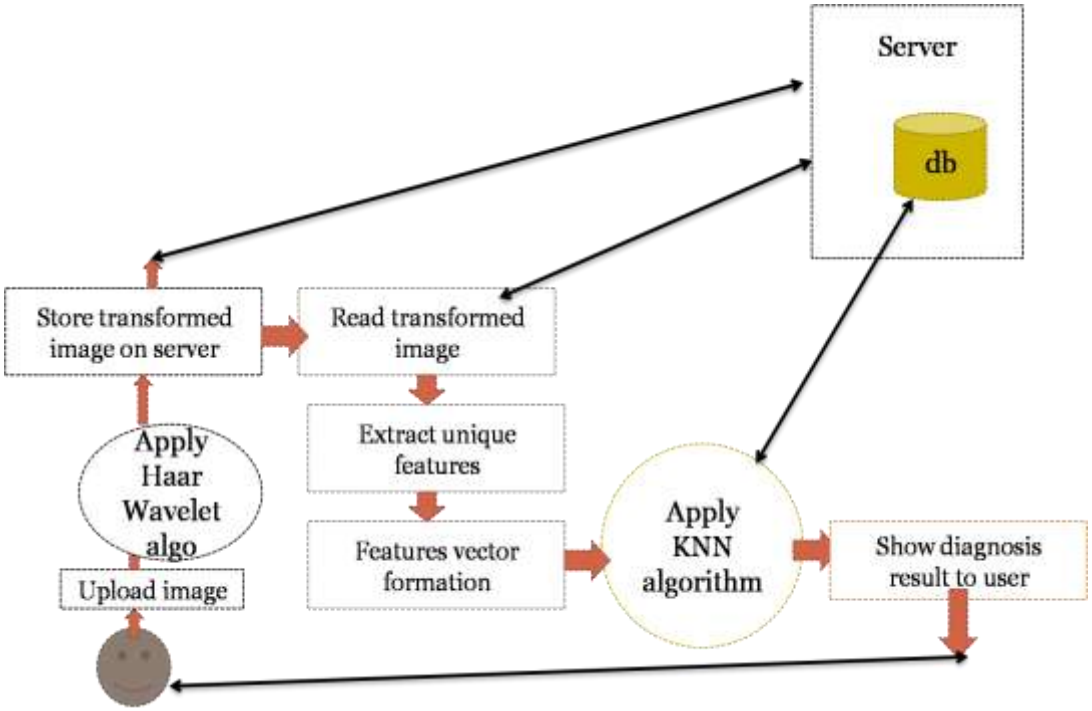

Figure1. Working of proposed system

After image uploading, steps involved in the execution are as follows:

- Image Transformation
- Feature Extraction
- Image Classification

A. Image Transformation

Image transformation is an operator or function which takes an image as its input and provides an image as its output. Image transformation can be simple operations which convert images from one representation to another. In image transformation stage, uploaded image will be transformed into the gray scale image using Haar Wavelet transform algorithm. After transformation, the image will be stored on server.

B. Feature Extraction

Feature extraction is the most significant step in image classification. It helps in extracting the feature of an image. Feature extraction provides features that will be helpful in classifying images. It is transformation of input data into a set of features. Type of dimensionally reduction is feature extraction which effectively represents impressive parts of an image. The purpose of feature extraction is to transform the input data into a reduced set of features that extract the relevant information from the input data [6]. In feature extraction stage, system will read the transformed image from server. System will scan complete image and it will extract unique image feature and store in matrix. In feature matrix will be transfer to image classification step.

C. Image classification

Image classification refers to the task of extracting information classes from a multiband raster image. The images taken are in the form of pixels and changing it into digital images that make sense is known as image classification. Image classification will be done with the help of KNN algorithm. In KNN algorithm we will calculate the Euclidean distance extracted from the previous step. According to Euclidean distance, system will form clusters of multiple stages. Among them most suitable cluster will be considered as final malaria stage.

IV. CONCLUSION

Lot of research has been done to make malaria detection process automatic. There are various methods available for detection of malaria parasite such as histogram based thresholding method, Holography technique, Morphological operations and so on. The proposed System is used to improve the accuracy of the malaria parasite detection system. Also, the proposed system can be used to detect malaria parasite in early stages to avoid any health complexity.

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