Viral Disease Prediction and Infected Area Detection using Artificial Intelligence

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Abstract: The health care environment is found to be rich in information, but poor in extracting knowledge from the information. This is because of the lack of effective analysis tool to discover hidden relationships and trends in them. By applying the machine learning algorithms and techniques, valuable knowledge can be extracted from the health care system. Malaria and Dengue have group of condition affecting the structure and functions of body and has many root causes. We are using Deep Learning algorithms to increase the accuracy of Malaria and Dengue Disease prediction System. We also expand this system to analysis the particular area to maximum patient will health is weak based on hospital patient data with the help of clustering. It is implemented as desktop application in which user submits the heterogeneous data like text and image of blood cells symptoms. It retrieves hidden data from stored database and deep learning model and compares the user values with trained data set.

Keywords- Machine learning, Disease prediction, Area detection, Malaria, Dengue.

I. INTRODUCTION

There Welcome to the AI for Social Good Series, where we will be focusing on different aspects of how Artificial Intelligence (AI) coupled with popular open-source tools, technologies and frameworks are being used for development and betterment of our society. "Health is Wealth" is perhaps a clichéd quote yet very true! In this system, we will look at how AI can be leveraged for detecting malaria, a deadly disease and the promise of building a low-cost, yet effective and accurate open-source solution. The intent of the system is two-fold understanding the motivation and importance of the deadly disease Malaria and Dengue and the effectiveness of deep learning in detecting Malaria and Dengue.

Modern A major challenge facing healthcare organizations (hospitals, medical centers) is the provision of quality services at affordable costs. Quality service implies diagnosing patients correctly and administering treatments that are effective. Poor clinical decisions can lead to disastrous consequences which are therefore unacceptable. Hospitals must also minimize the cost of clinical tests. They can achieve these results by employing appropriate computer-based information and/or decision support systems. Most hospitals today employ some sort of hospital information systems to manage their healthcare or patient data.

II. PROBLEM STATEMENT

Dengue and malaria fever is a major problem in many developing countries, including India. For dengue patient monitoring, platelet count is vital to ensure early treatment in order to prevent disease complications. In primary health care centers platelet counting is typically performed manually, which is labor intensive and requires an experienced laboratory technician. Another method used, is the Advia hematology analyzer, which is very expensive, not affordable for rural and remote areas. To address present day challenges, developed an automated approach for the detection of dengue and malaria using the blood cell images based on machine learning, along with the symptoms helps in assisting the detection of dengue and malaria. And by expanding the system also analysis particular area where patient health is weak.

III. LITERATURE SURVEY

Dengue fever is a mosquito-borne tropical disease caused by the dengue virus. It is a disease that causes severe discomfort and may lead to death at times, if left untreated [1].

The status of dengue infection can be identified by the platelet count of the patient. The count goes low according to the severity of illness, and it becomes normal when the patient recovers from the infection. So, for early detection of dengue infection and for monitoring the health of a patient, platelet count is very crucial. The symptoms of dengue fever usually are noticed after an incubation period of 4–13 days after the bite of the infected mosquito [2].

After the incubation period, the illness is followed by three main phases: febrile, critical, and the recovery phase [3].

Platelets are one of the three cellular elements of the blood, whose function (along with the coagulation factors) is to stop bleeding. In dengue affected cases the platelet count is normally below 150,000 and is known as thrombocytopenia. The range of platelet count varies according to the course of dengue illness [4].

Blood smears of normal cases and blood smears containing the dengue virus were collected and examined under a digital microscope. Shown in figure 1&2 are the microscopic digital images of blood smear. The Leishman's stain characterizes the lymphocytes by a purple color and the cytoplasm as a thin blue film surrounding it [5].

It is possible to identify the cells containing a virus by observing the change or distortion in the size and shape of the lymphocytes. In a lymphocyte containing a virus, the cytoplasm will be seen as slightly thicker and distorted and the shape of the lymphocyte wills distinguishable [6].

IV. PROPOSED SYSTEM

A. System architecture:

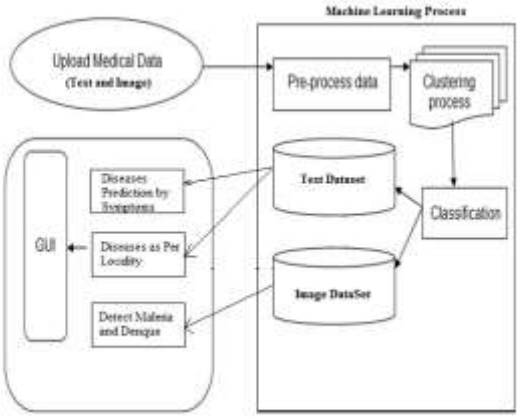

Fig 1. System architecture

The people are suffering from the many viral diseases like Dengue, Malaria. This information is collected from the various hospitals and the analysis of data is done and prediction of some diseases can be made. This system gives the prediction as per locality of the area.

Description:

Module 1:

In this system we detect the malaria and dengue diseases based blood cell dataset and apply image processing with the help of machine learning technique.

Module 2:

After that we collect the patient data from every hospital in particular area for identify the exactly which area disease will spread out more based on clustering algorithm.

Model 3:

Here provide the module for detecting diseases based on symptoms.

B. Mathematical Model:

Let 'S' be the system

- Where,
  - **S= {I, O, P, Fs, Ss}**
  - Where,
  - **I = Set of input Set of output**
  - **P = Set of technical processes**
  - **Fs = Set of Failure state**
  - **Ss = Set of Success state**

- Identify the input data I1, I2, , In

I = {(Input Data (Text, Image), Dataset (Dengue, Malaria))}

- Identify the output applications as O1, O2,,On

{(Malaria Detection, Dengue Detection)}

- Identify the Process as P

P = {(Image pre-processing, Image Processing, Grey-scale, smoothing, Edging, segmentation, feature extraction, classification, show result)}

- Identify the Failure state as Fs

Fs = {(If data set not loaded, If not predicted, if more time required to predict}

- Identify the Success state as Ss

P = {(Correct prediction within time)}

V. RESULT

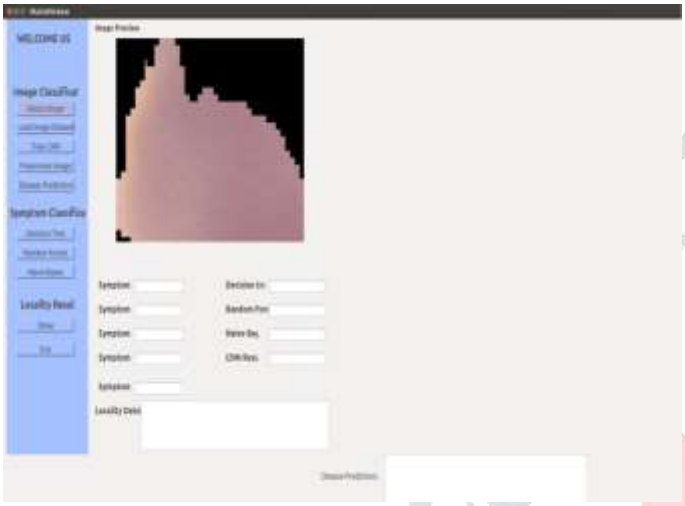

Fig 2. Main home screen

Fig 3. Decision tree output

Fig 4. Locality prediction

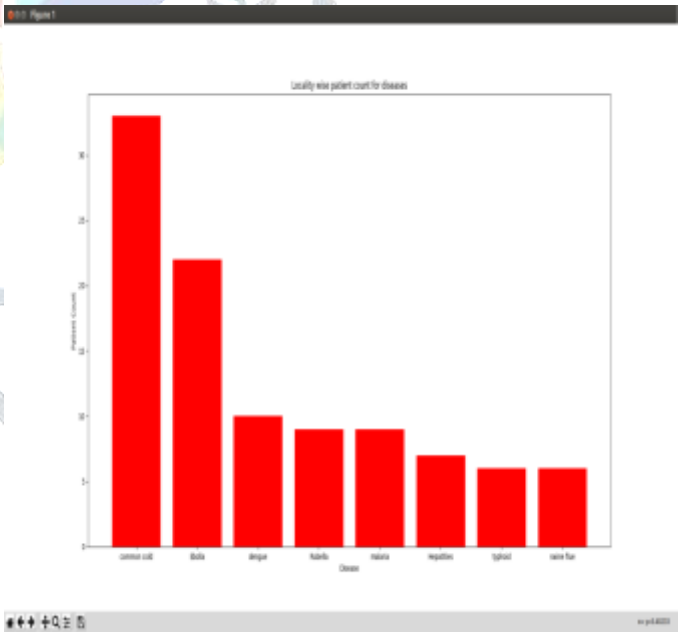

Fig 5. Locality prediction by graph

VI. CONCLUSION

A robust and novel method by using machine learning for diagnoses malaria and dengue has been implemented in this paper. By using this method we obtain the less than 60 seconds time to give a diagnosis as compared to other clinical laboratories.

The prediction algorithm is design to predict the area in danger zone of particular disease by considering the locality from the database to calculate the results. The results have to be the same as the Python output, as well as keeping to an acceptable processing speed and duration. The research will focus on the benefits it can provide for the successful diagnosis of malaria, dengue and the supportive treatment. The system prediction is very important in the awareness about the viral disease spreading in the locality as people get alerted by the system about any particular disease so they take precautions about that.

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