Electronic Health-Card System for Identification of Communicable Disease Location Using Machine Learning

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Abstract: Health is one of the most significant factors that need to be scrutinized. In the present scenario, it is very essential to know the health details of the people around us. Besides, identifying the origin of communicable diseases plays a key role in preventing the spread of diseases. In this paper, we are discussing the issues that are being faced and implementing a model to address those problems. It is high time to deploy a certain system where a person can know the health status of people around him/her using a simple authentication system. This can be achieved through our model where people are provided with a card that is equipped with a QR code. This authentication system is used to get access to the health status of a person. In addition to this, it can identify the place where the disease or virus effect is more using machine learning algorithms. It is not compulsory that the person belonging to the same locality has to visit the same hospital or any hospital in the same locality. So wherever the person may visit the hospital, his/her data needs to be updated. Here, we propose a web application to update data. This data is used to analyze and identify the hotspots. Analyzing and Identifying similar symptoms among people of the same locality, we can predict the spread of disease. An alarming system is required for the officials to know the hotspot regions and also the disease that is spreading. The prediction analysis made through this model helps the authorities to take necessary actions at that particular location. In the future, many companies, shopping malls and public places where many people gather require this system to check the people's health status instantly.

IndexTerms – **Communicable diseases, unique authentication system, E-health card, Machine learning algorithms**

I. INTRODUCTION

A communicable disease is an illness or infection that is transmissible by an infectious agent or its toxins, either indirectly or directly. This can be transmitted from one person to another either through the product of the individual or by a vector that increases the growth of pathogenicity in individual humans. Non-Communicable diseases are those which are present in a single human being and are not passed through the environment. These diseases show less impact on a community. Whereas communicable diseases have a major impact of spreading. Electronic health care system is the prominent method that is being introduced to analyze the health conditions of the patients in digital mode. In the present existing system, it has become very important to everyone to maintain proper records of their health conditions. These records are mainly focused on the non-communicable diseases like diabetes, heart diseases etc. and the patient's past health status. But in today's situation, it is crucial to know the health status of the people around you.

The aftermath of Covid19 resulted in many changes in people's hygiene. The primary symptom for all communicable diseases is body temperature. If we could find the temperature of the person and update his temperature on a server, if we could bring a simpler method of reading the temperature of the people around you, it could help us identify sick people. This can be an alerting system, so that the person takes necessary precautions like wearing a mask, sanitizing his place etc. This paper brings a novel way of identifying the temperature of people around you.

Prediction methods have been introduced for the users so that they can know the disease with the help of symptoms. With the predicted disease, the user can know the hotspot regions of that disease. In this paper we talk about the prediction methods as well as the hotspot identifying methods. We are introducing SMS to the municipality members about the location and spread of disease

II. LITERATURE REVIEW

The majority of previous papers on the healthcare system discussed non-communicable diseases. Examples of non-communicable diseases are diabetes, heart related problems, blood pressure issues, kidney and liver related problems and all the diseases that are not transferred from one person to another person. The papers are mainly focused on these types of infections or problems. In this system the health records are stored in digital format. With the help of these digital services the person can access the past health records. These records are classified and analyzed using machine learning algorithms for predicting the health status of the person. This predicted health status is used by the doctors whenever the person is in an emergency. To track the spread of the disease, hospital data needs to be classified and filtered according to the requirements. But this process is a hectic work because of the presence of redundant data and also because the data is unorganized. Machine learning plays a crucial role in predicting diseases with the help of symptoms. Prediction of a disease will be a challenging task to know the health issues. Widely used prediction methods are K-Nearest neighbor (KNN) and Convolutional Neural Networks (CNN).

In one of the papers the data sets are taken from the UCI machine learning website. This website contains the data sets of all diseases with their symptoms. These data sets are in the form of a list sand need to be pre-processed such that the white spaces are removed. This data is classified using KNN and CNN algorithms. This paper compares the analysis of KNN and CNN and concludes that CNN is better in performance and speed than KNN algorithms.

III. METHODOLOGY

3.1 User Module

The users have to first register through the portal. The registered user can use their unique QR code. This QR code is used to see the temperature of the person. If a person scans the QR code, this helps the person to see his temperature data. The temperature sensor, which is connected to a WIFI module, connects to the nearest router and updates the data to the server. The scanner which is used here is insta-scan which is used for scanning QR code using PHP. This scanner will read the QR code and find the contents stored in them. After login, a user can have access to predict the disease. This process in the website is shown in fig.1.
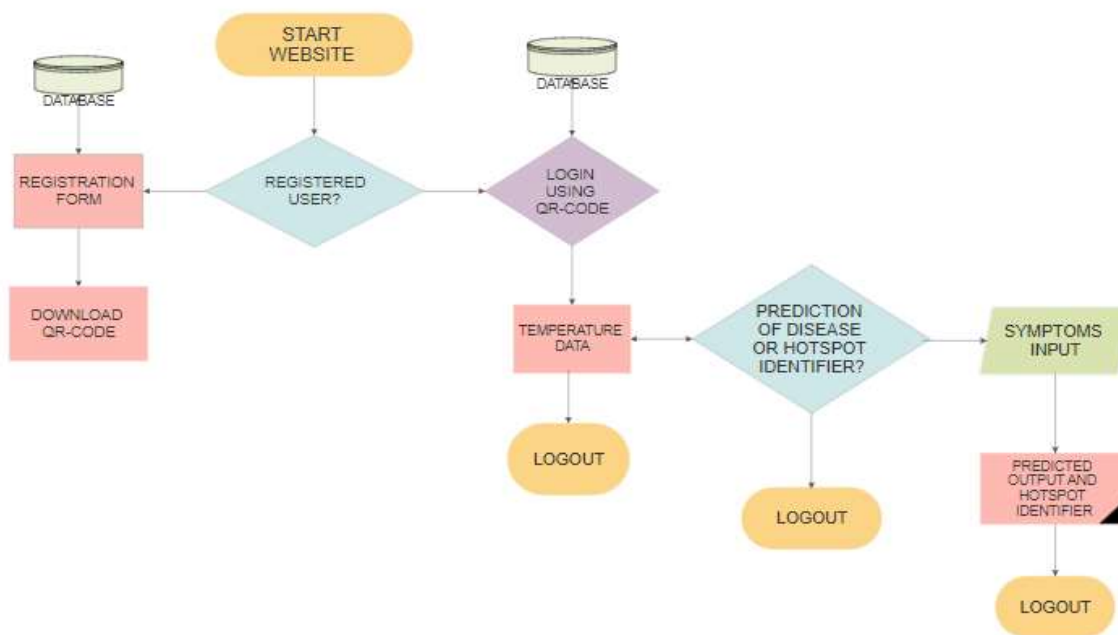
Fig. 1 Flowchart describing the process of the user module

3.2 Admin Module

The Fig.2 describes the steps in admin module. Every hospital is given with an admin portal for login. In this module the symptoms of the patients along with location is updated into the server.
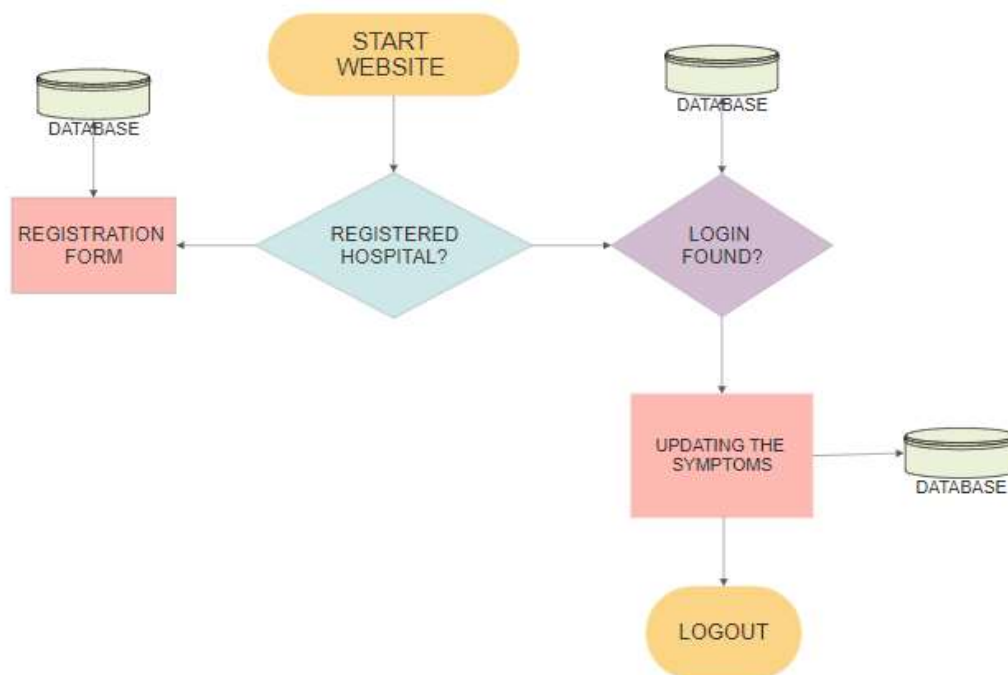

Fig. 2 Flowchart describing the process of Admin module

3.3 Prediction Analysis and Hotspot Identification

The third flowchart in fig.3 shows the flow of predicting disease and finding the hotspot. When the user logged in now he can have access to predicting the diseases based on his symptoms. The developed Machine Learning model predicts the corresponding disease from his symptoms. Users can manually select the symptoms on the website and predict the disease. To find the hotspot

areas, the Affinity propagation clustering algorithm is used. From the database provided by the admin that is from the authorized hospitals, they store disease along with the location coordinates, from there hotspot regions are identified, from hotspot areas, and if the user finds the hotspot in his region, so that he can consult a doctor. On the same website, there is an admin section. In this section, a hospital is given admin access. The admin can update the diseases of the patient to the server. With these updates on the server, the hotspots are formed.
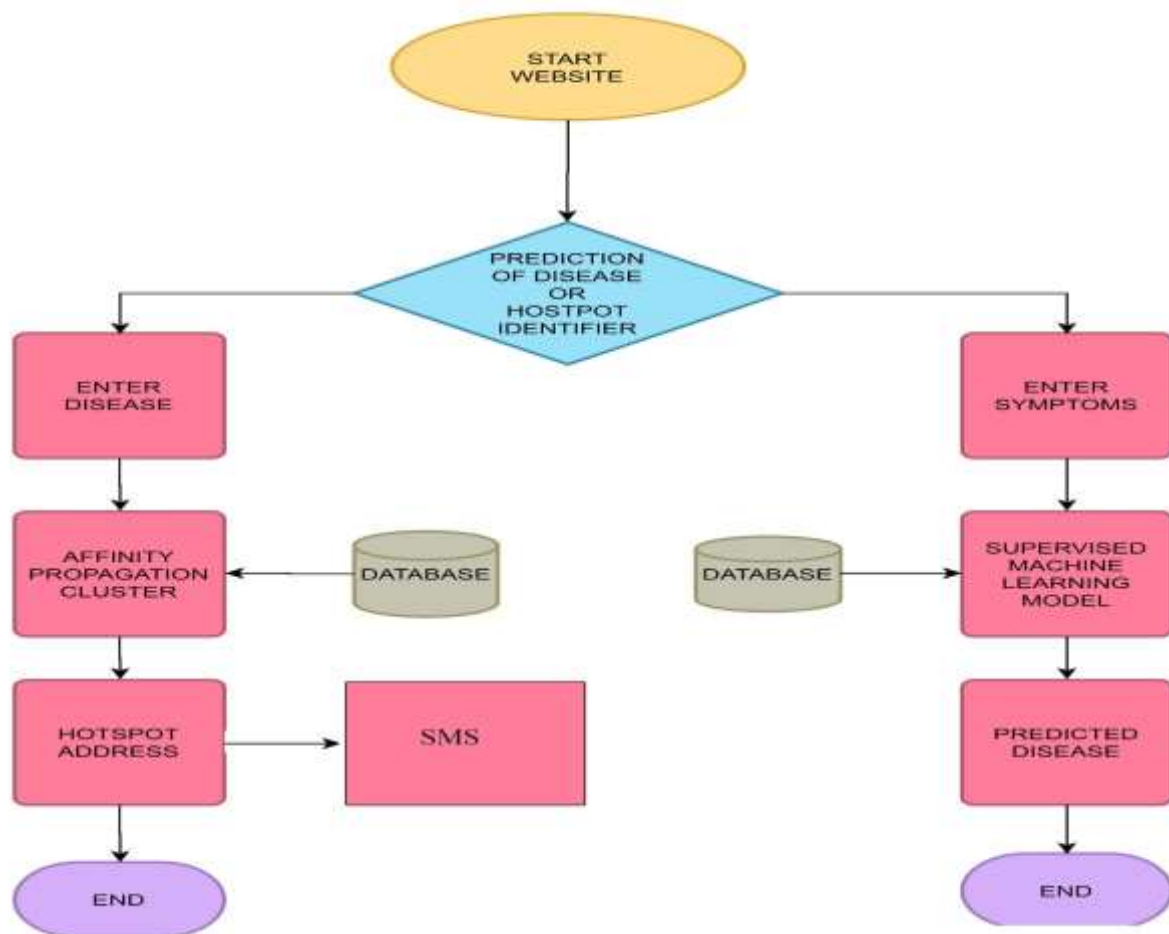
Fig. 3 Flowchart showing about the machine learning algorithm
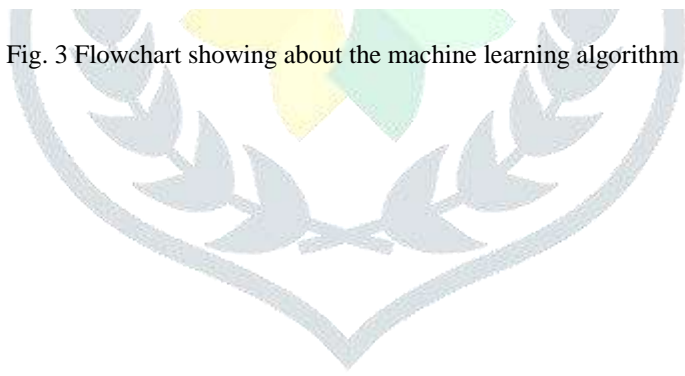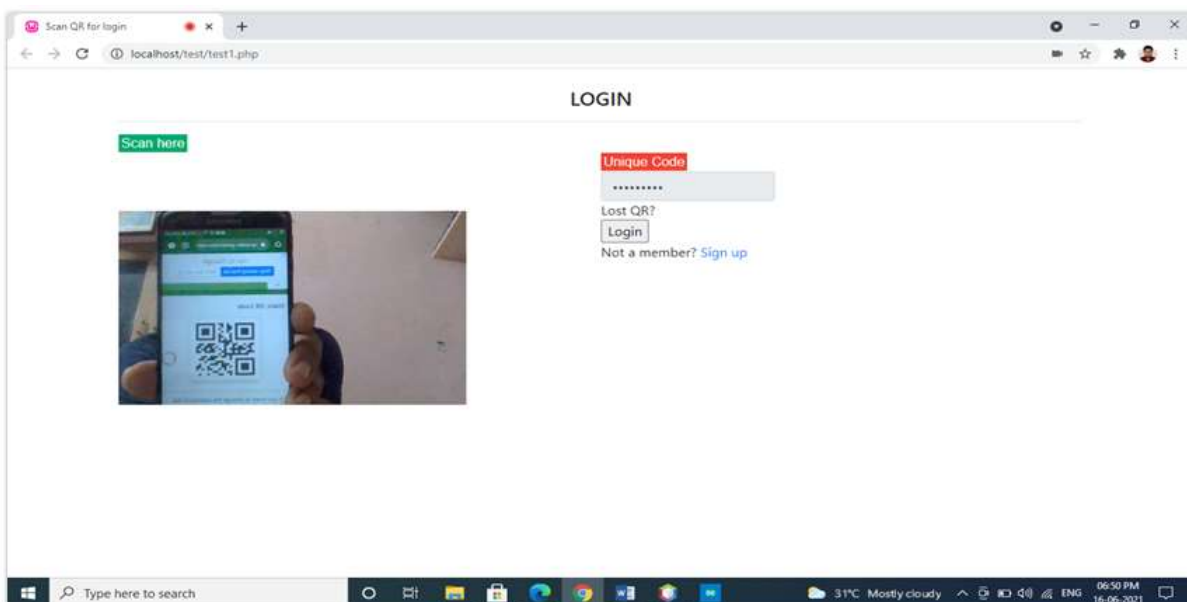
IV. RESULTS:

Fig. 4 QR login

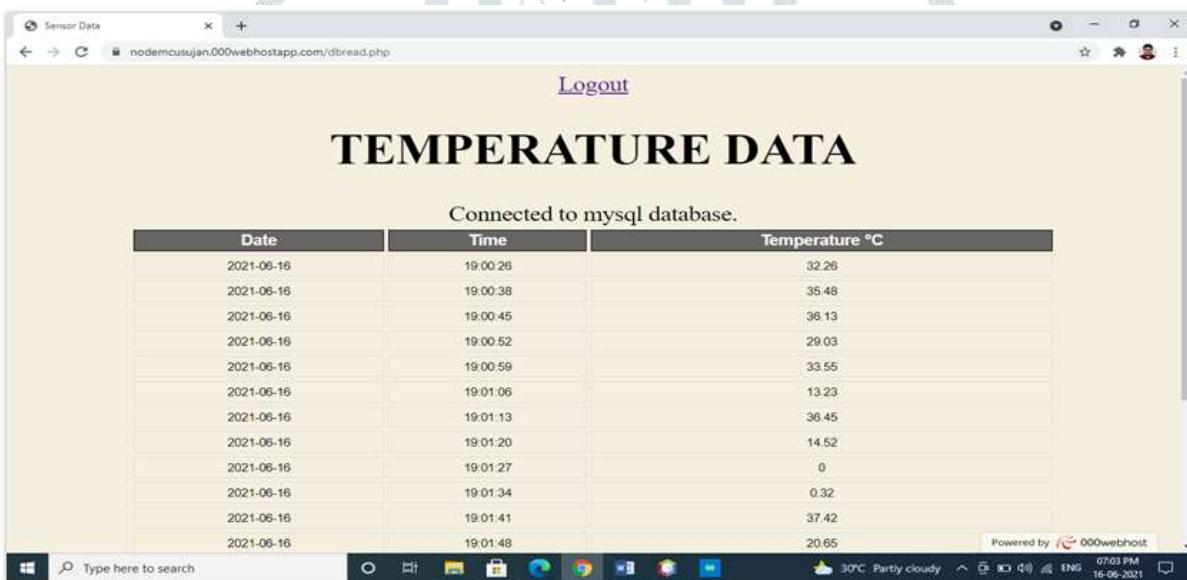Above figure a simple authentication system using QR code.

Fig. 5 Temperature data of a person after login

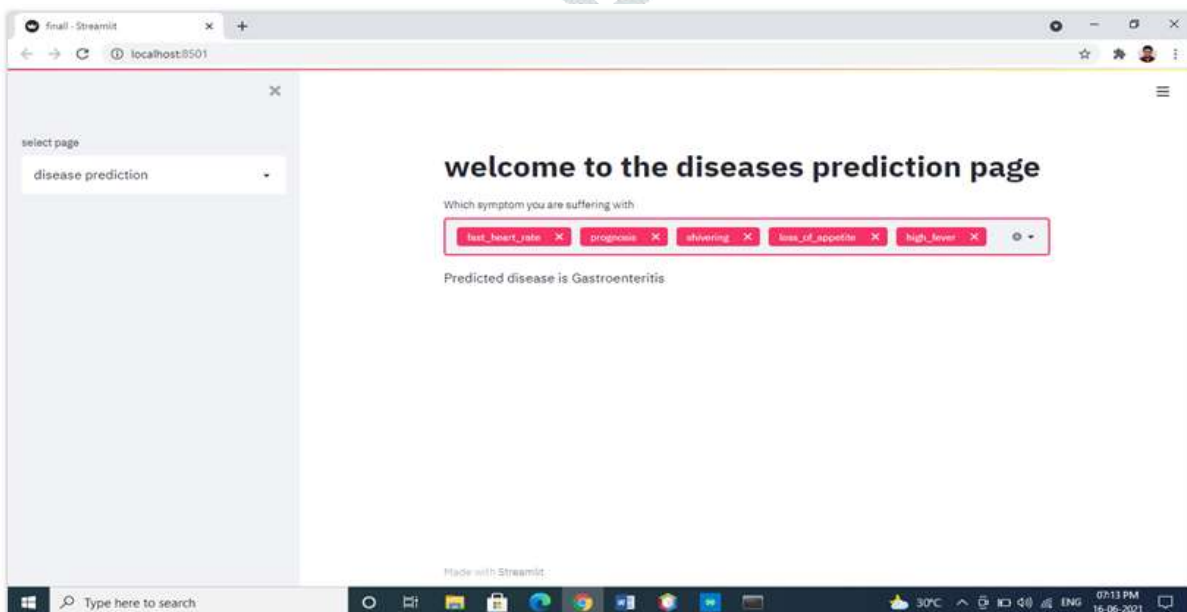Above figure shows the temperature of the person after successful login.

Fig. 6 Predicted disease after entering symptoms

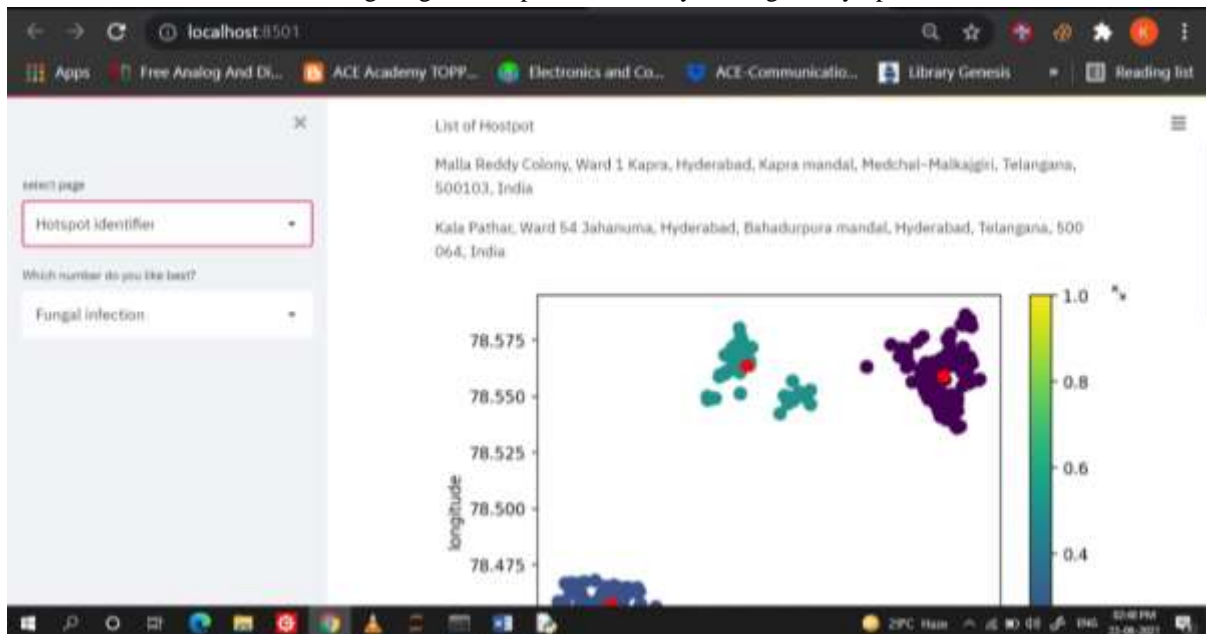Above figure gives the prediction analysis for given symptoms.

Fig. 7 Finding hotspot with datasets

In above figure, it displays the hotspot areas.

V. FUTURE SCOPE:

In the future, we add non-communicable diseases and make records of the person's health history. With the past health records, we can make a recommendation system for the patients. With the help of a website, we can add suggested doctors and can make appointments. We can update the status of the vaccination. We can also add a statistics where it calculates the weekly or monthly expenditure on medicines. We can bring a recommendation system for health insurance policy.

VI. CONCLUSIONS:

This project is an easy authentication and login portal to know the health status of the people around you. The project helps the people or the authorities about the spreading of disease in their locality. It works as an alerting system for future problems that are caused due to communicable disease. It identifies the hotspot areas where the disease spread is maximum. In this project, we created a website such that the users can quickly login using a QR code. QR codes bring a wide range of applications for instant login and help the users to see the temperature data. With the instant login, one can see another person's temperature history and take necessary precautions. Besides, with the help of a website, one can predict the diseases by manually entering the symptoms. This brings the user to know about his current health status. With the predicted disease, one can know the hotspot regions and based on his surroundings, and he can immediately consult a doctor if many people are suffering from the same kind of diseases. This work can identify the hotspots and can notify the people about the threat in their locality.

VII. ACKNOWLEDGMENT:

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