

MOBILE APPLICATION FOR DISEASE DETECTION USING ML MODEL

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ABSTRACT

Technology is getting smarter day by day and us, humans, we want everything on our smart phones and devices. We are living in click-based life. In 2020 world came to halt when a global pandemic invaded us. Where most of the businesses were in loss, this pandemic gave rise to innovative ideas in startups and technology. Taking in account the accessibility and availability of smart phones, there can be enormous transformation in medical field using mobile based technology and applications, soon. Various mobile based applications are already being used and being improved every day. In this demonstration we are working on the technology that will help user to get his/her health report via email or application based notification. We are developing functions to identify whether the user have asthma, hypoxemia or diabetes. This ML based project will be deployed on flask and to connect the mobile application and website we will use flutter.

Keywords –Machine learning, Mobile application, Web application

INTRODUCTION:

The increase in technology has given rise to mobile based applications that helps us to keep our health in check with just a click. With social distancing and fear of getting affected by Covid-19 people prefer not to go to doctors and clinic for non-emergency things. Our application could help user to understand their health status. Medical care is rapidly being transformed by the introduction of new information technology and computer science approaches. New and exciting opportunities exist for improvements for both patients in terms of health and satisfaction, and healthcare systems in terms of effective patient management. For patients, it is possible to develop computer based tools to increase patient understanding of their medical condition and to improve their compliance with medication regimes. As an example, a computer-based personal health support system named ManageMyCondition, showed clear benefits for improving the patient's quality of life and promoting more efficient use of health care [1]. For healthcare systems, instead, computer based tools allow the integration of multidisciplinary care and real time tracking of critical patient specific data, which are functionalities very important in providing comprehensive and effective medical condition management[3] [4][5]. Various platforms are made free of cost or pocket friendly to use. Here we will be using firebase to store our database and extract for mobile application and website. Flask is use for building our web application in backend and ML model deployment and Flutter for building Mobile Application.

Asthma Detection

Respiratory problems can cause asthma, acute asthma attacks are very difficult to predict because they often occur suddenly and asthma can also cause death in sufferers because the breath can suddenly

stop.[4] The purpose of this research is to design an asthma detection using mobile based application through indicators of heart rate and oxygen saturation. Moderate acute asthma is characterized by an oxygen saturation level of 92% to 95%, a pulse of 100 to 125 beats per minute, a respiratory rate of 20 to 30 breaths per minute [6] Changes in heart rate and oxygen saturation can affect the respiratory system if they show abnormal values. We will design a mobile based application that can help to detect whether user is suffering from asthma by using the oxygen saturation level, Heart rate and Respiratory rate.

Diabetes Detection

The diabetes is one of lethal diseases in the world. It is additional an inventor of various varieties of disorders for example: coronary failure, blindness, urinary organ diseases etc. Diabetes is a situation which causes deficiency due to less amount of insulin in the blood. Warning sign of high blood sugar results in frequent urination, feeling thirsty, increased hunger. If it is not medicated properly and on time, it will lead to many difficulties. Various information mining algorithms are present with different decision support systems for assisting health specialists. The effectiveness of the decision support system is recognized by its accuracy [3] Therefore, the objective is to build a decision support system to predict and diagnose a certain disease with extreme amount of precision. Our mobile application will consist of ML which detects whether the user is suffering from diabetes depending upon readings. Blood sugar level less than 140 mg/dL (7.8 mmol/L) is normal. When reading of blood sugar is more than 200 mg/dL (11.1 mmol/L) after two hours indicates diabetes. When reading of blood sugar comes between 140 and 199 mg/dL (7.8 mmol/L and 11.0 mmol/L) indicates prediabetes [6]

Hypoxemia Detection

Hypoxemia is an abnormally low level of oxygen in our blood. To be more specifically, it is oxygen deficiency in arterial blood. Hypoxemia has many causes, and often causes hypoxia as the blood is not supplying enough oxygen to the tissues of the body. Many studies have reported that 40% of patients receiving Home Oxygen Therapy have sleep-related oxygen desaturation. To deal with this situation, a nocturnal pulse oximetry is used to measure oxygen saturation (SpO₂) and control the flow rate of highly concentrated oxygen [5]. We will add feature to detect hypoxemia in our mobile application to help user understand their health better. Normal oxygen saturation is usually between 96% and 98%. Any level below this is considered dangerous and leads to hypoxemia [6]

RELATED WORK

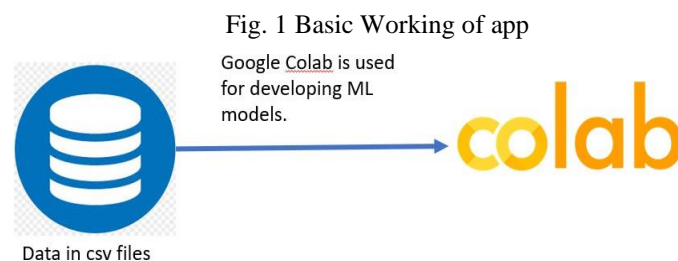
Cristiano Tapparello et al [1] discussed about how the three applications related to healthcare system will be running on Android devices, and their integration with the Cloud infrastructure. In particular, how to automatically update the content of the applications, store and retrieve data, manage the notification and messaging system, and transparently keep the data synchronized on all the devices. Finally, particular emphasis will be given to the common functionalities implemented in the applications, thus showcasing the benefit of the modular structure defined by the ManageMyCondition framework. Yahya Alhomsy et al [2] described the use of Firebase in a specialized medical and healthcare education context-Extracorporeal Membrane Oxygenation (ECMO) simulation. ECMO

training is a multi-disciplinary process that demands speed, flexibility, and cooperation. Based on these criteria, a simulator is designed accordingly with a proper communication system. Low-latency, robustness, remote control, and hardware compatibility were the selection constraints of the wireless technology. Firebase (along with WiFi) was chosen as the method of communication. For this application, it proved to be reliable, compatible with the hardware used, and fast as per the aforementioned constraints and tests.

Priyanka Sonar and Prof. K. JayaMalini[3] explained types of diabetes and how structured and unstructured big data on diabetes can be stored and processed in the different machine learning algorithm. Selvi Indriani et al[4] proposed the paper on how we can detect asthma in patients using heart rate and oxygen saturation. The testing of the tool is done by comparing the module with a standard measuring instrument that produces the highest value of oxygen saturation error which is 1.71% and the largest value of heart rate error is 3.54%. Lastly Shintaro Izumi et al [5] helped us understand in this paper, we proposed an automatic nocturnal hypoxemia classification method using nocturnal pulse oximetry. Three patterns of the abnormal oxygen level waveform are detected automatically using the proposed signal processing method. The automatic classification can contribute toward patient-specific home oxygen treatment regimens to treat nocturnal hypoxemia. The measured SpO₂ waveforms from 48 patients were analyzed using the proposed method and classified into three distinct patterns, namely, sustained, periodic, and intermittent patterns. The same waveform results were evaluated and classified by ten chest physicians. Both the classification results show that the proposed method achieves 100% sensitivity for the sustained and periodic patterns and the sensitivity of the intermittent pattern is 71.4%.

OVERVIEW OF OUR PROJECT

Number of applications are available that target different diseases and can be downloaded on android and iOS devices. We are developing a mobile application that can help user detect asthma, diabetes and hypoxemia. This demonstration will show the three applications described above running on Android and iOS devices, and their integration with the Cloud infrastructure. User can update the content in the applications,. This data will be stored in firebase database and admin can retrieve data from there.



Using ML model admin will get the results of user, he can manage the notification and messaging system, and transparently keep the data synchronized on all the devices [2] Our Framework will send report via email and push up notifications. Firebase Firestore is used as the backend database to store the form filled that is accessed by the admin. Also in the mobile application, we will add physical exercise tab for stress management as doing exercises time to time makes the person healthy and active free from all sort of stress.

WORKING OF APPLICATION

ML models are made into pickle file. For making ML models we will use Google colab for which datasets are taken from Kaggle datasets. Using Google colab we will make pickle file for three different disease which are Diabetes, Hypoxemia and Asthma.

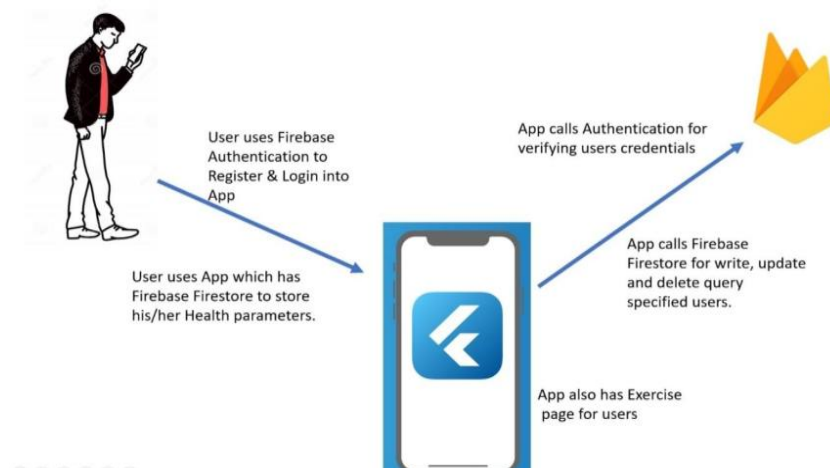


Fig.2 Use of Google Colab

In our Web Application we will use flask in the backend to do all the heavy lifting required for loading html CSS pages and using ML models for prediction.

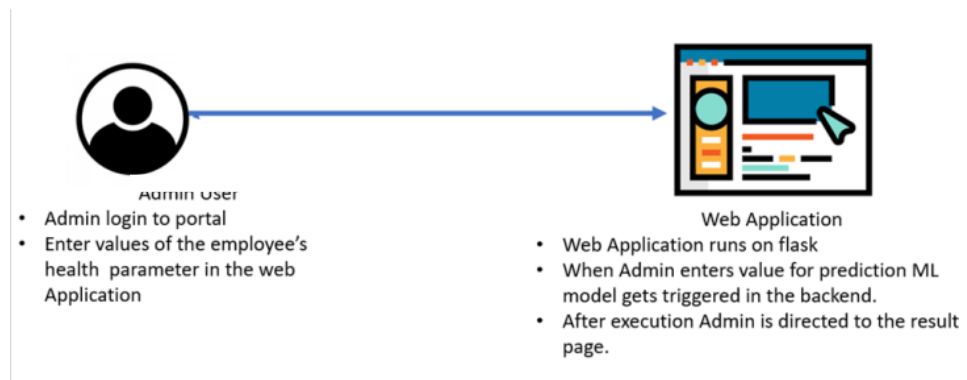


Fig.3 User's and admin's Role

When Admin will reach to the result page he will see a message that will say either send a mail or send a message pop notification to the employee's phone using firebase cloud messaging service.

This concludes our web application working

CONCLUSION

We will be able to meet most of the goals like detection of asthma, diabetes, and hypoxemia and send reports via email and notification but as we know our industry changes every single day thus even project can be fine-tuned.

FUTURE WORK

In Future project can be upgraded using UI perspective and updates like automatic email and Chat bot features can also be added. In this project there is scope of automation in Web application which is email automation i.e. whenever admin is done prediction process then on the bases of the end result by the ML model prediction automatic email is triggered to respective employees email id. Improvement can be done in project by adding a chat bot using Dialog flow of Google cloud services.

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