Health Care Platform based on ML and Deep Learning

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Overview

Machine learning is used to discover patterns and predict different results which are capable of performing complex tasks in an efficient way from medical data sources and provide excellent capabilities to predict diseases.

Therefore we are building a **single unified platform** serving as Doctors assistance for predicting medical results as well as serving Patients to effectively communicate with Doctors and maintain their Health records accessible on the go.

Our system **capitalizes on the computer's large computing capability and also the doctor's reasoning ability**. The machine will do all of these tasks then present its outcomes to the doctor for confirmation.

Flow Chart for Project
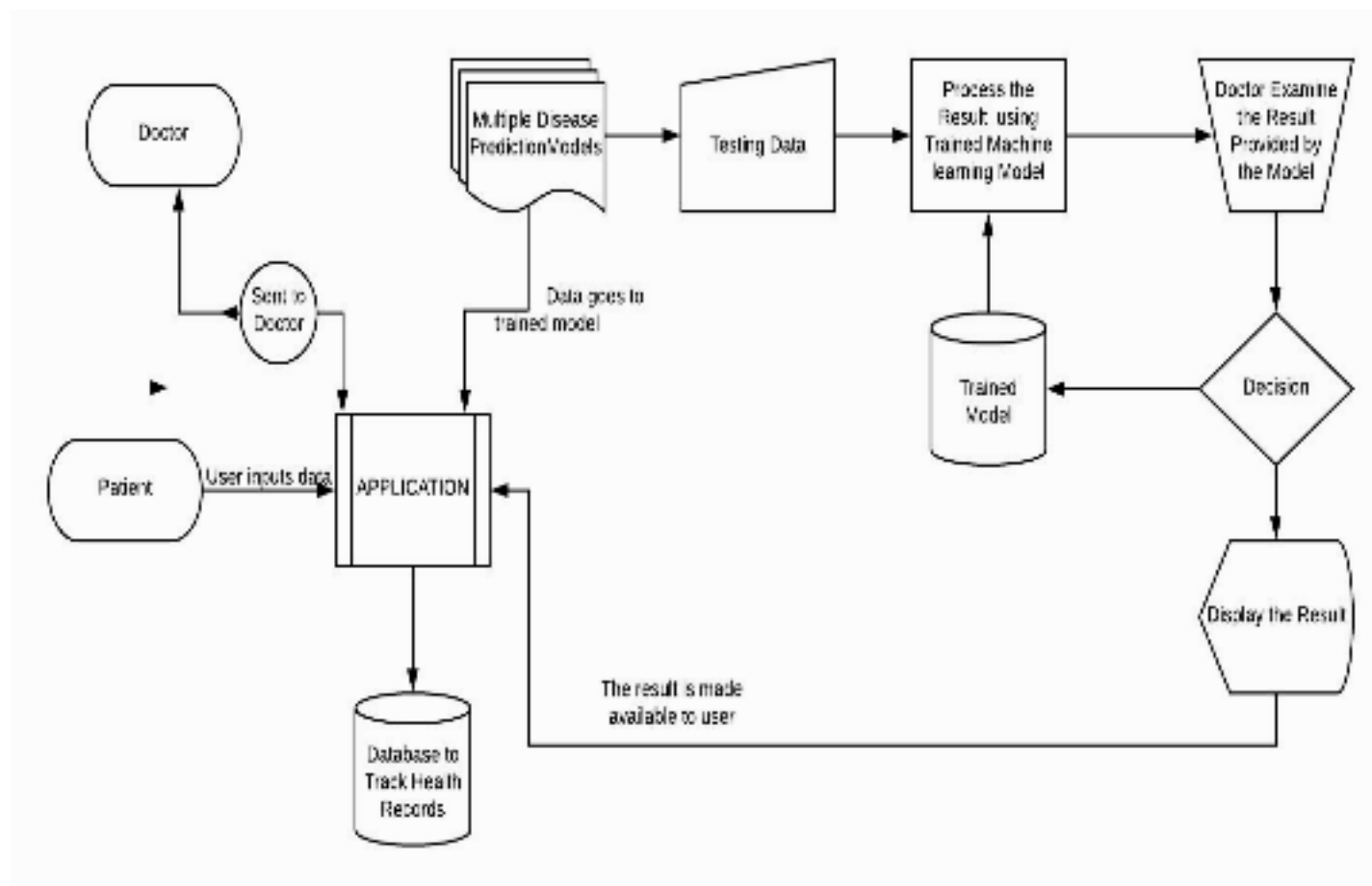
Motivation Towards the Project

Machine learning in medicine has recently made headlines.

- Google has developed a machine learning algorithm to help identify cancerous tumors on mammograms.
- Stanford is using a deep learning algorithm to identify skin cancer.

  We have tried to implement a solution similar, using Deep Learning Convolutional Neural Network with around 83% accuracy.

- A recent JAMA article reported the results of a deep machine-learning algorithm that was able to diagnose diabetic retinopathy in retinal images.

It's clear that machine learning puts another arrow in the quiver of clinical decision making. Still, machine learning lends itself to some processes better than others. Algorithms can provide immediate benefit to disciplines with processes that are reproducible or standardized. Also, those with large image datasets, such as radiology, cardiology, and pathology, are strong candidates. Machine learning can be trained to look at images, identify abnormalities, and point to areas that need attention, thus improving the accuracy of all these processes. Long term, machine learning will benefit the family practitioner or internist at the bedside. Machine learning can offer an objective opinion to improve efficiency, reliability, and accuracy.

Goals

1. Patients will be able to share their medical report securely with doctor and receive quick results.

2. Doctors will be able to test the report and different results using most efficient available **trained Machine Learning and Deep Learning backend endpoints and analyse the results**.

3. **Our ML/AI algorithm will train in real time using Reinforcement Learning** from the prediction given by various Doctors using the platform.

4. The patients will also be able to **track their Medical Records** and view it any time without any hassle.

Technological Specifications

We will be using Python for creating ML/AI and Training Endpoints and WebStack including NodeJS and AngularJS for Web-App Platform.

We will be covering many different Diseases and ML/Deep Learning Models.

1. Diabetes classification   -   Using KNN, Logistic Regression ,ANN.
2. Breast Cancer Prediction -   Using Logistic Regression
3. Lung Cancer   -   Using SVM and Image Processing
4. Liver Disease   -   Using KMeans
5. Skin Cancer Detection   -   Using Convolution Neural Network
6. Heart Disease Detection   -   Using SVM , Random Forest

Current Progress

1) Firstly, We have read different research paper on Medical and HealthCare which are published recently from prestigious platform and discussed the idea.
2) We have collected dataset from Internet and evaluate different parameters and based on these we have decided which parameters are useful or which are not.
3) After that we have applied different algorithms to particular dataset and analysed actually which algorithm is providing the best result.
4) We have worked on Breast cancer Prediction, Diabetes Classification, Heart Disease and Skin Cancer Detection using different algorithms.
5) We have also tried to dump and pickle the Models on the web to see there result whether they are working properly or not.

Future Plan

1) At first we will be building various machine learning algorithms on other diseases like Lung Cancer, Liver Disease, Tumor Detection and Segmentation and then will visualise the final results using various types of graphs .
2) Then we will be providing a proper Interface for both patients and doctors wherein the doctors will be able to access the particular patient's data like (patients medical records and reports, patients disease history, current medications and symptoms etc.) which would be uploaded by patient on our platform . Then the Doctor can predict the results of that particular disease efficiently .
3) We are also planning to include various other facilities to our application like maintaining health track records , reminding the patient of taking timely prescription, doctor can prescribe medication online, user can also get drug related information like their benefits, side effects etc.
4) We are also planning to work on Big Data because as we know that healthcare data is increasing exponentially which requires use of big data to handle it.

References

https://ieeexplore.ieee.org/document/8697439

https://ieeexplore.ieee.org/document/8748992

https://ieeexplore.ieee.org/document/7002866

https://news.stanford.edu/2017/01/25/artificial-intelligence-used-identify-skin-cancer/https://scotch.io/bar-talk/processing-incoming-request-data-in-flask

https://www.healthcatalyst.com/clinical-applications-of-machine-learning-in-healthcare

https://scotch.io/bar-talk/processing-incoming-request-data-in-flask