



Smart Medical Care Disease Prediction

Payal Takhware

M.Tech [PG] Scholar

Abstract: The main aim of this paper is to discuss about the use Disease Prediction of in the field of medical health care. Smart Medical Care Disease Prediction System Is the Fastest emerging area in the field of medical science. The global healthcare systems have been decimated by COVID-19. The coronavirus (covid-19) pandemic's emergence has significantly increased demand for the healthcare system globally. Numerous elderly people are struggling with health issues including high blood pressure, diabetes, heart attacks, and so forth. I'm producing healthcare in this project with the help of a deep learning algorithm that anticipates disease. Users interact with the system in a manner similar to that of a patient with a doctor, and the system identifies the symptom and predicts the disease based on the symptoms reported by users. BP and body temperature monitoring are crucial for that since the goal is to design and implement a low-cost, smart healthcare system that enables continuous assessment and tracking of patient fitness. I employed sensors that sent data over a wi-fi network utilizing a wi-fi module, enabling fact analytics and visualization by using healthcare personnel.

Keywords: Predict the disease, Data mining, medical diagnosis, WEB Application, blood pressure, and body temperature have been identified.

1 INTRODUCTION

Around the world, COVID-19 has a negative impact on people's lives and healthcare systems. Infections can also result in nosocomial dissemination, which has an impact on medical staff and treatment delivery in general. In the scenario of smart healthcare, the patient's information is kept on a server and can be downloaded as needed to carry out the required diagnosis. Thus, target to layout and implement a minimum priced and smart healthcare system that allows non-stop assessment and tracking of patient fitness, thus BP and frame temperature monitoring is critical for that Used sensors that transmit information over a wi-fi network via a wi-fi module that allows fact analytics and visualization by using healthcare workforce. At the time of registration, the patient or relative need to fill in full information about the patient disease along with disease history. Thus, it aims to design and implement an affordable and smart healthcare system that allows continuous assessment and monitoring of patient health; thus, BP and body temperature monitoring is essential for that I used sensors that transmit data over a wireless network through a Wi-Fi module that facilitates data analytics and visualization by healthcare staff. Hence, blood pressure and body temperature have been identified as the major vital physiological parameters to monitor the patient's health status. Focuses on the doctor and patient interaction in case of any emergency, our embedded project will send an SMS to the relative as Ill as the doctor. A couple of disease predictions using system learning to know. This WEB app evolved using Python. The fashion receivers to expect the disease had been skilled on large data sets. All links for data sets and therefore the Python notebooks used for version advent are cited below all

through this read me. The WEB app can are expecting the following disease. Diabetes, Heart Disease, Liver Disease, Malaria, Pneumonia Kaggle dataset will help you apply your present information to extraordinary use. Making use of understanding the area of medical technological know-how and making the venture of medical doctors clean is the primary reason for this dataset. Forms of illnesses can be anticipated. The aim of this project is to monitor the patient's health by doctors and relatives, To Predict diseases on the base of daily monitoring of patient health.

Research on the topic has concluded that by using Airable sensors, the machine learning

Algorithm can automatically detect disease. A user interacts with the WEB application just like one interacts with his doctor and based on the symptoms provided by users and the system will identify the symptom and predict the disease.

2 LITERATURE SURVEY

This project aims to monitor the patient's health by doctors and relatives, To Predict diseases on the base of daily monitoring of patient health. The patient's health by the doctors and relatives focusses on the doctor and patient interaction. Technology lets doctors focus only on treating patients. A user interacts with the WEB application just like one interacts with his doctor and based on the symptoms provided by users and the system will identify. The symptoms and predict the disease. This disease prediction, use of device getting to know, is totally via with the assistance of device studying and python programming language and the usage of the dataset it is available formerly

through the hospitals the usage of that I are going to expect the disease.

Summary of Operation

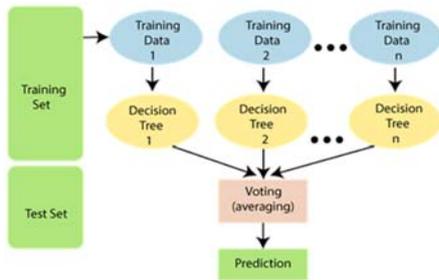


FIGURE 1: RANDOM FOREST DISEASE DETECTION

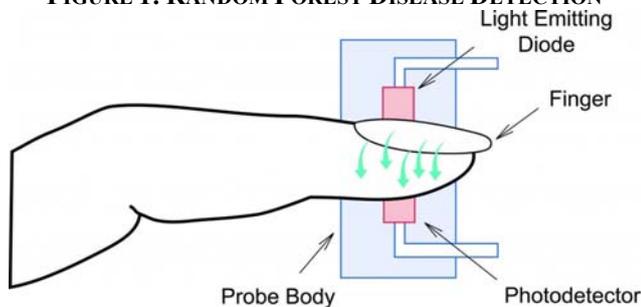


FIGURE 2: LIGHT THAT PASSES THROUGH THE FINGER

Pulse oximetry operates on the red and IR light absorption characteristics of oxygenated and deoxygenated hemoglobin. Blood oxygen concentration can be calculated from the ratio between the absorption red light and IR light by the hemoglobin. Heart rate is detected by the change of blood volume throughout the finger that is then quantified by the amount of light that passes through the finger.

3 ALGORISM

3.1 RANDOM FOREST DISEASE DETECTION

Algorithm I are used in my project is random forest, Random Forest: The random wooded area might be a supervised mastering rule that is hired for every class, moreover as regression. HoIver, but, it's in the main used for classification issues. As I all know that a forest is formed of trees and additional trees mean an additional sturdy forest. In addition, the random forest rule creates call timber on information samples and so receives the prediction from every one of the thoughts, and eventually selects the most effective decision by means of a method that of the vote. It's AN ensemble technique that is healthier than one call tree, as a result it reduces the overfitting by averaging the result.

3.2 CNN ALGORITHMS

A convolutional neural network (convent/CNN) is a deep learning algorithm that may absorb an entered image, assign importance (learn able lights and biases) to numerous elements/items within the image, and be able to differentiate one from the opposite. In- side deep studying, a convolutional neural network or CNN is a kind of artificial neural community that is extensively used for photo/object popularity and class. Deep studying, therefore, acknowledges gadgets in a photo by using a CNN. I suggest an entirely com- posterized convolutional neural community (CNN) primarily based version for the analysis of malaria from microscopic blood cell pics.

Due to the success of deep learning algorithms in analyzing medical images, Convolutional Neural Networks (CNNs) have gained much attention for disease classification. In addition, features learned by pre-trained CNN models on large-scale datasets are much useful in image classification tasks. In this work, I appraise the functionality of pre-trained CNN models utilized as feature-extractors followed by different classifiers for the classification of abnormal and normal chest X-Rays. I analytically determine the optimal CNN model for the purpose. Statistical results obtained demonstrates that pretrained CNN models employed along with supervised classifier algorithms can be very beneficial in analyzing chest X-ray images, specifically to detect Pneumonia. Chest X-Rays which are used to diagnose pneumonia need expert radiotherapists for evaluation. Thus, developing an automatic system for detecting pneumonia would be beneficial for treating the disease without any delay particularly in remote area

3.3 ALGORITHM IS USED IN PNEUMONIA DETECTION

I analytically decide the optimal CNN model for the purpose. Statistical consequences received demonstrate that pretrained CNN models employed at the side of supervised classifier algorithms can be very beneficial in analyzing chest x-ray snapshots, particularly to discover pneumonia.

3.4 SYSTEM ARCHITECTURE

It is the purpose of this paper to present the design and implementation of a health- care monitoring system customized to meet the needs of patients using several hardware components.

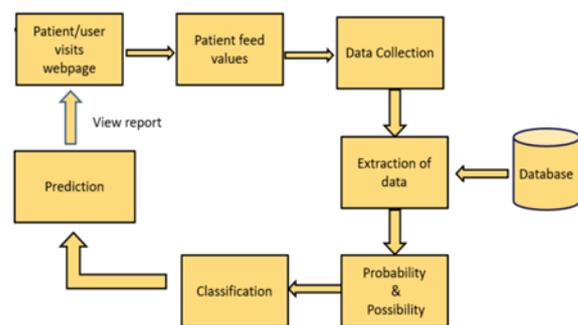


FIGURE 3:SYSTEM ARCHITECTURE

It is the purpose of this paper to present the design and implementation of a health-care monitoring system customized to meet the

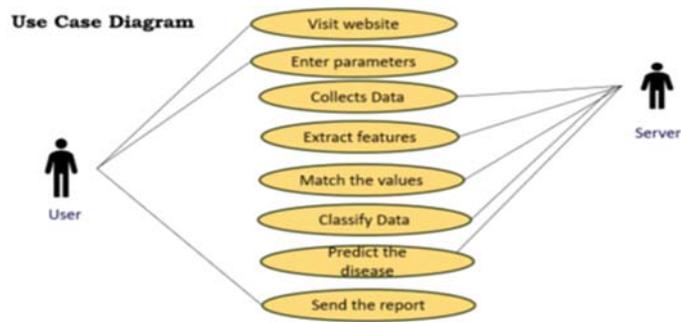


FIGURE 4: HTMP WEB PAGE NEEDS OF PATIENTS USING SEVERAL HARDWARE COMPONENTS.

3.5 WORK PROCEDURE

At first, I am planning to collect as much data set as I can from the Kaggle Website. Then the collected data sets will be trained using the Machine Learning Algorithm.

Then, the best algorithm is taken and rendered into the model.

Then the model will be kept in the back-end server as a pickle file. JWT Connection will be made between the front-end and the back-end of the communication.

The Basic Tasks of this project can be classified into 3 types, developing an environment to train the model using data sets, integrating the model into the server as a pickle file, and developing a WEB

The Project solely depends upon the data set of patient's afterbites for prediction, so the data sets are fetched from the Website called 'Kaggle'.

About 2000 unique attoweber data sets are collected from the Kaggle Website for precise model rendering using Machine Learning In the specification of the Arduino Uno microcontroller board there are 14 digital pins on the right and left side of the board for input/output, 6 analog inputs, a 16 MHz crystal oscillator, a USB link, a poi jack, an ICSP header, and a reset button (of which 6 can be used as PWM outputs). It includes anything required to help the microcontroller; simply connect it to or power it with an ACC device with a USB cable.

3.6 ATMEGA328/P

The atmel@picopIr@atmega328/p is a low-energy cmos 8-bit microcontroller based totally on the avr@greater RISC structure. Via executing powerful commands in a single clock cycle, the atmega328/p achieves throughput near 1MIPS according to mhz. This me- pois the system designed to optimize the device for power consumption versus processing speed.

3.7 ESP8266 NODEMCU WIFI DEVKIT

The core of this module is the esp32 chip that is scalable and adaptive. Two CPU cores can be individually controlled. The clock frequency is adjustable from eighty MHz to 240 MHz and supports rots. It is a general-purpose Wi-Fi+BT+BLE MCU module's-WROOM- 32s the module integrates traditional Bluetooth, Bluetooth, low energy, and Wi-Fi. A wide range of making use of wi-fi supports a large variety of verbal exchange connections, in addition to a right away connection to the internet via a router; Bluetooth permits customers to hook up with a cell smartphone or broadcast a BLE beacon for sign detection.

3.8 INTERNET OF THINGS (IOT)

Internet of Things, more commonly IoT is an emerging concept in the technical world. I want more comfort in our lives. The net has emerged as a core part of our lifestyle. This IoT is based on this collaboration of comfort and the Internet.

- ThingSpeak is an IOT analytics platform service that lets you collect and store sensor data in the cloud and develop Internet of Things applications.
- The ThingSpeak service also lets you perform online analysis and act on your data. Sensor data can be sent to ThingSpeak from any hardware that can communicate using a REST API
- ThingSpeak is a Web Service (REST API) that lets you collect and store sensor data in the cloud and develop Internet of Things applications.

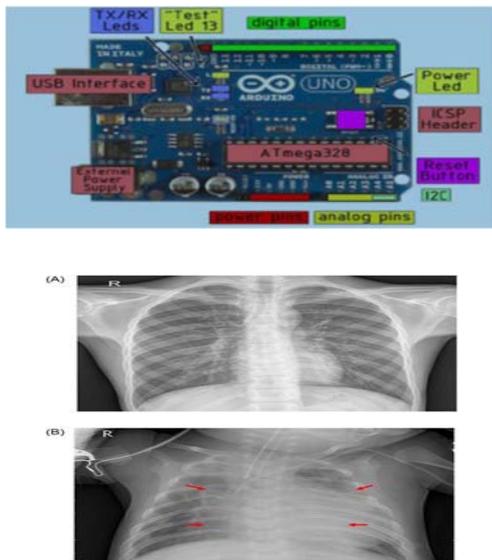


FIGURE 5: X-RAY PLATES THAT DISPLAY APPLICATION FOR THE USER EXPERIENCE.

4 CONFIGURATION AND SETTINGS

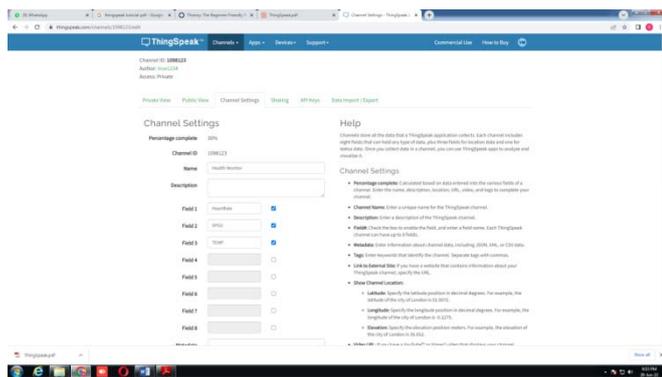


FIGURE 6 THINGSPEAK CONFIGURATION AND SETTINGS

4.1 PULSE OXIMETER AND HEART-RATE SENSOR IC FOR IARABLE HEALTH

Max30100 is an integrated pulse oximeter and heart charge screen sensor solution. It's an optical sensor that derives its readings from emitting wavelengths of mild led — a red and an infrared one – then measures the absorbance of pulsing blood through a photo detector. This particular led coloration aggregate is optimized for reading the records via the end of one's finger. Its miles are absolutely configurable via software registers and the digital output statistics are saved in a sixteen-deep FIFO within the tool. It has an i2c virtual interface to talk with number microcontrollers.

4.2 BODY TEMPERATURE (BT) SENSOR (LM35)

The LM35 is the preferred to thermistors and thermocouples as it calWEbrates itself, has a low heating capability, and has high precision. This sensor outputs a voltage in centigrade with a sensitivity of 10mV/degree Celsius. The LM35 can output voltages in various degrees Celsius; this component interfaces Ill with Arduino Uno via the ADC (Analog to Digital Converter) module. This project aims to monitor the patient's health by doctors and relatives, To Predict diseases on the base of daily monitoring of patient health, Research on the topic has concluded that by using Iarable sensors, the machine learning algorithm can automatically detect Parkinson's disease Machine learning allows us to build models that associate a broad range of variables with a disease. Data science and machine learning platform Neural Designer brings together different data types into a single model to better diagnose diseases.

5 APPLICATIONS

The information gathered helps give the best prescription drug plan for individual pa- tents, based on their needs and interests. The device can show the patient which of the various plans will be the most beneficial, considering their individual needs and character- is tics that align with those of other past patients. It describes a tool by which the quality of treatment for bed rest patients is improved using a WEB application. The patients teem- premature and blood pressure data are monitored and

stored in the cloud using the Internet of things (IOT) application. Digital healthcare WEB applications are capable of diagnosing a disease that a patient is suffering from using his/her symptoms, and sending them a notify- cation at the specified time so they can take their medication. One of the great things about this application is that it also sends them alerts when they should take a dose of insulin, an antibiotic, or any other medication.

5.1 MODULE DESIGN BASED ON RANDOM FOREST ALGORITHM FOR DIFFERENT DISEASES

Diabetes

The Kaggle data set will help you apply your existing knowledge to great use. Applying Knowledge to the field of Medical Science and making the task of physician easy is the main purpose of this data set. This dataset has 132 parameters on which 42 different types of Diseases can be predicted.

This dataset is at the beginning of the country-wide institute of Diabetes and Digestive and kidney sicknesses. The goal of the dataset is to diagnostically are expected whether or now not a patient has any kind of diseases, based on certain diagnostic measurements inside the dataset.

The system web application home page, HTML page designer, and the prediction output for a different disease.

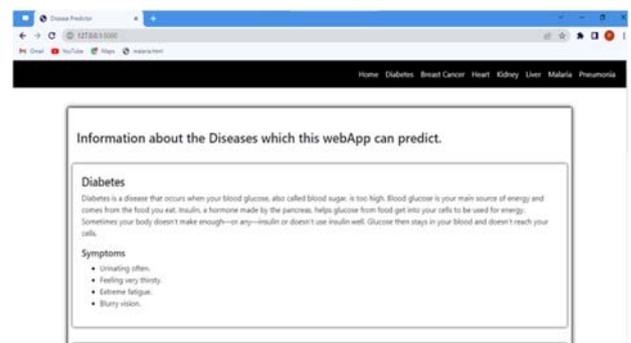


FIGURE7 :HOME PAGE

5.2 DIABETES DISEASE PREDICTION

The result consists of several medical predictor (independent) variables and one target (dependent) variable, Outcome. Independent variables include the number of pregnancies the patient has had, their BMI, insulin level, age, and so on.

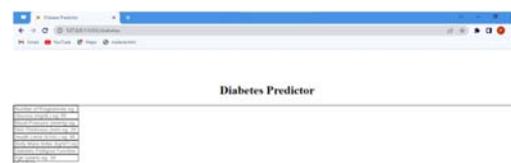


FIGURE 8 DIABETES DISEASE PREDICTION PAGE BREAST CANCER DISEASE PREDICTOR

The result consists breast cancer can be predicted using a Machine Learning Technique named Random Forest Classifier. This classifier structures the data into numerous trees and obtains a final result i.e., whether a person is at risk of having breast cancer or not.

Based on chemical compounds (bilirubin, albumin, protiens, alkaline phosphatase) present in human body and tests like SGOT, SGPT the outcome mentioned whether person is patient i.e., needs to be diagnosed or not.



FIGURE 9: BREAST CANCER DISEASE PREDICTOR PAGE

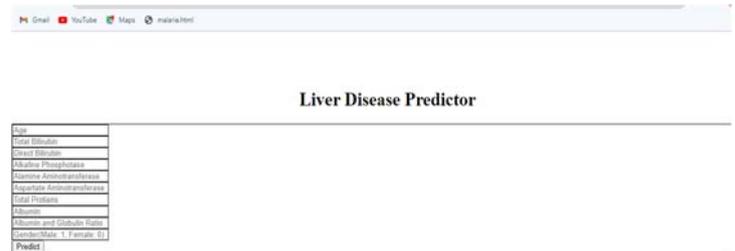


FIGURE 12: LIVER DISEASE PREDICTOR PAGE

5.3 HEART DISEASE PREDICTOR

By applying different machine learning algorithms, the result shows the training of the dataset with the attributes used for the purpose was the Public Health Dataset and it is dating from 1988

5.4 PNEUMONIA DISEASE PREDICTOR

Chest X-ray images (anterior-posterior) were selected from retrospective cohorts of pediatric patients of one to five years old from Guangzhou Women and Children’s Medical Center, Guangzhou. All chest X-ray imaging was performed as part of patients’ routine clinical care.

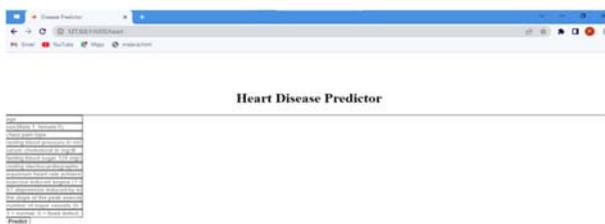


FIGURE 10: HEART DISEASE PREDICTOR PAGE KIDNEY DISEASE PREDICTOR

Machine learning algorithms can effectively predict kidney disease with dataset, which consists of several medical predictor variables and one target variable, Class. Predictor variables include Blood Pressure (Bp), Albumin (Al), etc.



FIGURE 13: PNEUMONIA PAGE

FIGURE 14: OUTPUT FOR THE HEALTHY PATIENT

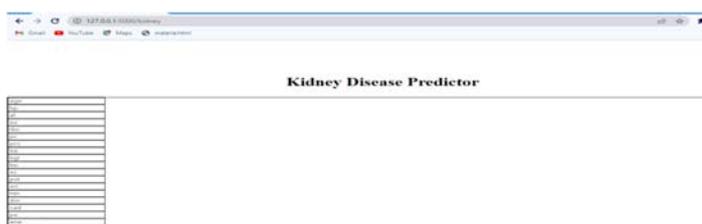


FIGURE 11: KIDNEY DISEASE PREDICTOR PAGE LIVER DISEASE PREDICTION

FIGURE 15: MALARIA OUTPUT



FIGURE 16: PNEUMONIA OUTPUT

6 ARDUINO SOFTWARE

6.1 UNDERSTANDING ARDUINO SOFTWARE ARCHITECTURE

In order to understand how to make nice Arduino board work exactly need to, understand the global software architecture and the tool chain that should be using quite soon. Take Arduino board, a rectangle-shaped IC with the word ATMEL written on the top; this is the processor. When buy (check Appendix G, [List of Components'](#) Distributors, and this link: <http://arduino.cc/en/Main/Buy>) an Arduino, the processor, also named chipset, is preborn. It has been programmed by careful people in order to make our life easier. The program already contained in the chipset is called the boot loader (<http://en.wikipedia.org/wiki/Bootling>). Basically, it takes care of the very first moment of awakening of the processor life when you supply it some power. But its major role is the load of our firmware (<http://en.wikipedia.org/wiki/Firmware>).

TABLE 1 :OBSERVATIONS TABLEFOR SPO2, BPM, TEMP

Observation	Oxygen saturation (SpO2) %	Pulse rate (bpm)	Temp (°C)
Normal readings	96% or more	40-100	36.5-37.5
Acceptable to continue home monitoring	95%	101-109	38
Seek advice from your GP	93-94%	110-130	38.1-39
Need urgent medical advice - call 999	92% or less	131 or more	39 or more

6.2 METHODOLOGY

For the proposed study, the dataset was taken from the Kaggle site. Then it was down- loaded in an Excel file using a comma separate format. Data has been processed by Python programming using Jupiter notebook. The data set contains 303

sample instances as shown in table3. The dataset contains 14 clinical features as shown in Table 2. Different types of Python libraries such as pandas, Sklearn, Numbly, and matplotlib are used for processing the algorithms. Using the explorative data analysis technique, data was analyzed in Jupiter notebook. A 10-fold cross-validation technique is used for splitting the data set into training and testing data. Then using a random forest algorithm, the dataset was processed.

7 RESULTS AND DISCUSSION

Hardwar & Thingspeak Data

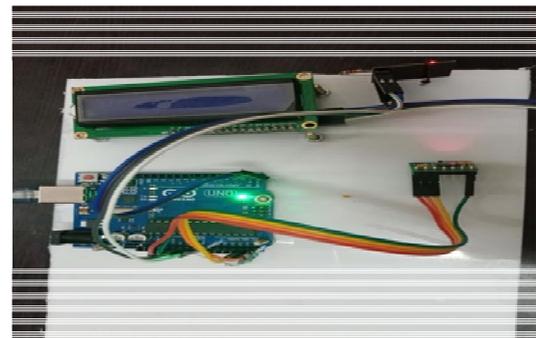


FIGURE 17 : HARDWAR& THINGSPEAK DATA PICTURES

The results of the patient health monitoring system Ire evaluated based on testing of the designed device prototype and interviews via questionnaires. The developed system was tested with ten (10) patients and the questionnaire was administered to 50 subjects between the age group of 30 years to 100 years to determine the usability and authenticity of the system and to ascertain the level of health status of the patient related to healthy or un- healthy conditions. In an attempt to ensure accurate data measurement, five experiments each (to obtain the average value generated by the sensors) Ire taken from the subjects with time duration of 1 min for heartbeat measurement and 3 min for body temperature measurement. The developed system was compared with the conventional heartbeat Stethoscope and digital thermometer for measurement deviation. Moreover, the difference between the developed system (measured data) and the conventional measuring devices (actual



data) was evaluated to show the effectiveness of the developed system. Disease prediction and treatment recommendation using machine learning. One can view the hospital using an android application nearby to his location in case he needs to take any health-related test or emergency based on the location he chooses. One can view the predicted disease, medication required, and nearby hospitals according to the prediction.

A dedicated system, which can solve all queries regarding medicine. Effective Symptom- based disease prediction. Suggest nearby hospitals based on the disease.

This project aims to monitor the patient's health by doctors and relatives, predict disease on the base of daily monitoring of patient health, and reach the doctor. Diagnosis is always a concern for people living in a rural area. At the same time, medicine availability also has a major impact excluding the factor of a major complete cure.

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