

# Smart Health System using Machine Learning

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**Abstract:** *There is limited preventive health care and services to promote optimal health and wellness, and avert worsening for children and adults with disabilities. Now-a-days, people face various diseases due to the environmental condition and their living habits. So the prediction of disease at earlier stage becomes important task. But the accurate prediction on the basis of symptoms becomes too difficult for doctor. The correct prediction of disease is the most challenging task. To overcome this problem data mining plays an important role to predict the disease. Medical science has large amount of data growth per year. Due to increase amount of data growth in medical and healthcare field the accurate analysis on medical data which has been benefits from early patient care. With the help of disease data, data mining finds hidden pattern information in the huge amount of medical data. We proposed general disease prediction based on symptoms of the patient. For the disease prediction, we use K-Nearest Neighbor (KNN) and Convolutional neural network (CNN) machine learning algorithm for accurate prediction of disease. For disease prediction required disease symptoms dataset. In this general disease prediction the living habits of person and checkup information consider for the accurate prediction. The accuracy of general disease prediction by using CNN is 84.5% which is more than KNN algorithm. And the time and the memory requirement is also more in KNN than CNN. After general disease prediction, this system able to gives the risk associated with general disease which is lower risk of general disease or higher.*

**Keywords:** CNN, KNN, Machine learning, Disease Prediction

## I. INTRODUCTION

Evolution of modern technologies like data science and machine learning has opened the path for healthcare communities and medical institutions, to detect the diseases earliest as possible and it helps to provide better patient care. Accuracy of detecting the possible diseases is reduced when we do not have complete medical data. Furthermore, certain diseases are region-based, which might cause weak disease prediction. Our body shows the symptoms when something wrong is happening within our body, sometime it may be just minor problem but sometimes we can have severe illness and if we do not take care of these symptoms at the early stage then it might be too late to cure the disease. we are using machine learning algorithms that try to accurately predict possible diseases. The results generated by the proposed system have an accuracy of up to 87%. The system has incredible potential in anticipating the possible diseases more precisely. The main motive of this study is to help the nontechnical person and freshman doctors to make a correct opinion about the diseases. Disease Prediction system is based on predictive modeling predicts the disease of the user on the basis of the symptoms that user provides as an input to the system. The system analyzes the symptoms provided by the user as input and gives the probability of the disease as an output Disease Prediction is done by implementing the Decision tree Classifier. DNN Classifier calculates the probability of the disease. Along with disease prediction system also calculates severity of disease and as per severity of disease suggests medicine. Suggesting diet and appropriate exercise is another merit of proposed system. Prediction of disease involves current as well as medical history of user. The prediction of disease at earlier stage becomes important task. But the accurate prediction on the basis of symptoms becomes too difficult for doctor. There is a need to study and make a system which will make it easy for end users to predict the harmonic diseases without visiting physician or doctor for diagnosis. Additionally, in terms of personalized healthcare and disease prevention services, these depend primarily on the strategy use to derive knowledge from the analysis of lifestyle factors and activities. Through the use of intelligent data retrieval and classification models, it is possible to study disease, or even predict any abnormal health conditions. To predict such abnormality, the Deep neural network (DNN) model is use, which can detect the knowledge related to disease

prediction accurately from unstructured medical health records. However, DNN uses a large amount of memory if it uses a fully connected network structure.

## II. LITERATURE SURVEY

### 2.1 Dhiraj Dahiwade, Prof. Gajanan Patle, Prof. Ektaa Meshram(2019) “ Designing Disease Prediction Model Using Machine Learning Approach “. IEEE.

Artificial Intelligence made computer more intelligent and can enable the computer to think, people face various diseases due to the environmental condition and their living habits. So the prediction of disease at earlier stage becomes important task. But the accurate prediction on the basis of symptoms becomes too difficult for doctor. The correct prediction of disease is the most challenging task. To overcome this problem data mining plays an important role to predict the disease. Medical science has large amount of data growth per year. Due to increase amount of data growth in medical and healthcare field the accurate analysis on medical data which has been benefits from early patient care. With the help of disease data, data mining finds hidden pattern information in the huge amount of medical data. We proposed general disease prediction based on symptoms of the patient. For the disease prediction, we use K-Nearest Neighbor (KNN) and Convolutional neural network (CNN) machine learning algorithm for accurate prediction of disease. For disease prediction required disease symptoms dataset. In this general disease prediction the living habits of person and checkup information consider for the accurate prediction. The accuracy of general disease prediction by using CNN is 84.5% which is more than KNN algorithm. And the time and the memory requirement is also more in KNN than CNN. After general disease prediction, this system able to gives the risk associated with general disease which is lower risk of general disease or higher.

### 2.2 Jianliang Gao, Ling Tian, Jianxin ,Yibo Chen ,Bo Song, Xiaohua Hu “Similar Disease Prediction with Heterogeneous Disease Information Networks”.

Studying the similarity of diseases can help us to explore the pathological characteristics of complex diseases, and help provide reliable reference information for inferring the relationship between new diseases and known diseases, so as to develop effective treatment plans. To obtain the similarity of the disease, most previous methods either use a single similarity metric such as semantic score, functional score from single data source, or utilize weighting coefficients to simply combine multiple metrics with different dimensions. In this paper, we proposes a method to predict the similarity of diseases by node representation learning. We first integrate the semantic score and topological score between diseases by combining multiple data sources. Then for each disease, its integrated scores with all other diseases are utilized to map it into a vector of the same spatial dimension, and the vectors are used to measure and comprehensively analyze the similarity between diseases. Lastly, we conduct comparative experiment based on benchmark set and other disease nodes outside the benchmark set. Using the statistics such as average, variance, and coefficient of variation in the benchmark set to evaluate multiple methods demonstrates the effectiveness of our approach in the prediction of similar diseases.

### 2.3 Anjan Nikhil Repaka, Sai Deepak Ravikanti,Ramya G FranklinNing(2019) “Design And Implementing Heart Disease Prediction Using Naives “

Data mining, a great developing technique that revolves around exploring and digging out significant information from massive collection of data which can be further beneficial in examining and drawing out patterns for making business related decisions. Talking about the Medical domain, implementation of data mining in this field can yield in discovering and withdrawing valuable patterns and information which can prove beneficial in performing clinical diagnosis. The research focuses on heart disease diagnosis by considering previous data and information. To achieve this SHDP (Smart Heart Disease Prediction) is built via Navies Bayesian in order to predict risk factors concerning heart disease. The speedy advancement of technology has led to remarkable rise in mobile health technology that being one of the web application. The required data is assembled in a standardized form. For predicting the chances of heart disease in a patient, the following attributes are being fetched from the medical profiles, these include: age, BP, cholesterol, sex, blood sugar etc... The collected attributes acts as input for the Navies Bayesian classification for predicting heart disease. The dataset utilized is split into two sections, 80% dataset is utilized for training and rest 20%

is utilized for testing. The proposed approach includes following stages: dataset collection, user registration and login (Application based), classification via Navies Bayesian, prediction and secure data transfer by employing AES (Advanced Encryption Standard). Thereafter result is produced. The research elaborates and presents multiple knowledge abstraction techniques by making use of data mining methods which are adopted for heart disease prediction. The output reveals that the established diagnostic system effectively assists in predicting risk factors concerning heart diseases.

#### **2.4 Domenico Formica , Emiliano Schena “Smart Sensors for Healthcare and Medical Applications”**

This special issue on “Smart Sensors for Healthcare and Medical Applications” focuses on new sensing technologies, measurement techniques, and their applications in medicine and healthcare. We proposed this topic, being aware of the pivotal role that smart sensors can play for the improvement of healthcare services in both acute and chronic conditions as well as for prevention towards a healthy life and active aging. In this editorial we shortly describe the potential of smart sensors in the aforementioned applications, before moving on providing a general overview of the 24 articles selected and published in this special issue. A convolutional neural network consists of an input layer, hidden layers and an output layer. In any feed-forward neural network, any middle layers are called hidden because their inputs and outputs are masked by the activation function and final convolution. In a convolutional neural network, the hidden layers include layers that perform convolutions. Typically this includes a layer that performs a dot product of the convolution kernel with the layer's input matrix. This product is usually the Frobenius inner product, and its activation function is commonly ReLU. As the convolution kernel slides along the input matrix for the layer, the convolution operation generates a feature map, which in turn contributes to the input of the next layer. This is followed by other layers such as pooling layers, fully connected layers, and normalization layers.

Recent advances in mechatronics, Internet of Things, wearable devices, and the miniaturization of sensors and electronics have significantly increased the capabilities of smart sensors enlarging the range of their applications. Among others, healthcare and medical fields have been strongly influenced by the evolution of these technologies, which are providing substantial contributions in several applications in the field. In fact, smart sensors are increasingly offering novel solutions to several relevant challenges in healthcare, such as early detection of pathologies, or minimally invasive management and prevention of high-burden diseases (e.g., cardiovascular diseases and cancer). Furthermore, the development of miniaturized and lightweight smart sensors-based systems may be a key player in enabling a more rapid growth of unobtrusive and unsupervised approaches to home-rehabilitation and continuous monitoring

### **III. PROPOSED SYSTEM**

The correct prediction of disease is the most challenging task. To overcome this problem datamining plays an important role to predict the disease. Medical science has large amount of data growth per year. Due to increase amount of data growth in medical and healthcare field the accurate analysis on medical data which has been benefits from early patient care. With the help of disease data, data mining finds hidden pattern information in the huge amount of medical data. We proposed general disease prediction based on symptoms of the patient. For the disease prediction, we use K-Nearest Neighbor (KNN) and Convolutional neural network (CNN) machine learning algorithm for accurate prediction of disease. For disease prediction required disease symptoms dataset. In this general disease prediction the living habits of person and checkup information consider for the accurate prediction. The accuracy of general disease prediction by using CNN is 84.5% which is more than KNN algorithm. And the time and the memory requirement is also more in KNN than CNN. After general disease prediction, this system able to gives the risk associated with general disease which is lower risk of general disease or higher

They are constantly in contact with infected person in hospital and also with health Hospital staffs are among the frontline workers who fight against contagious diseases. They are constantly in contact with infected person in hospital and also with health symptoms of different diseases is fed as input to system along with current symptoms of user and medical history of patient (when patient observed same type of symptoms before). Python based system used DNN algorithm to predict disease patient is suffering from. After predicting disease system classified disease into mild, moderate and severe conditions.

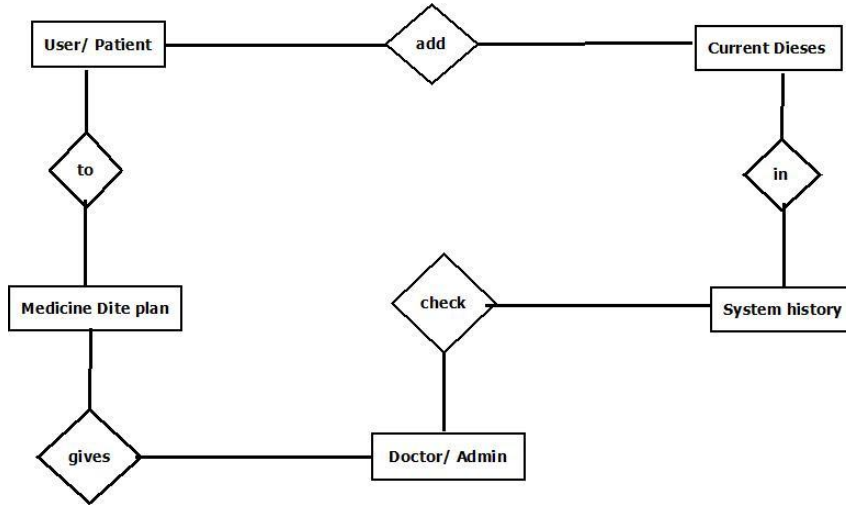


Fig : system architecture block diagram

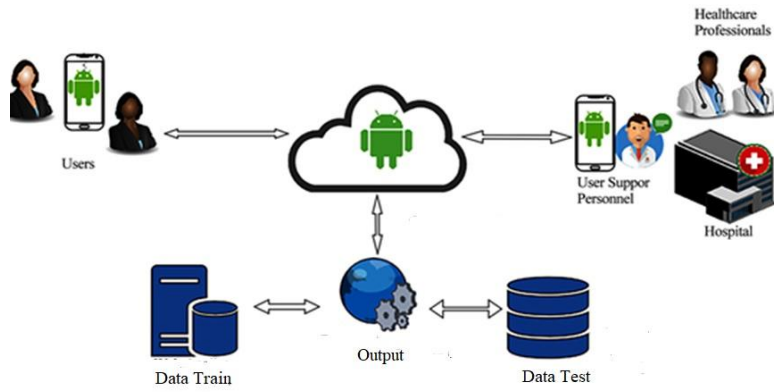
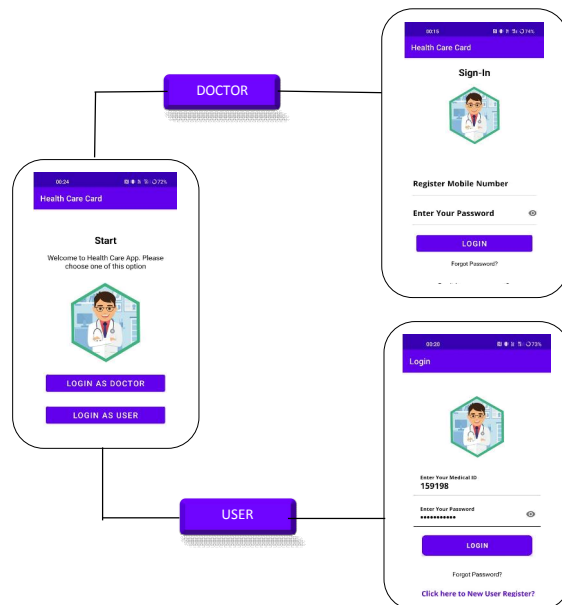


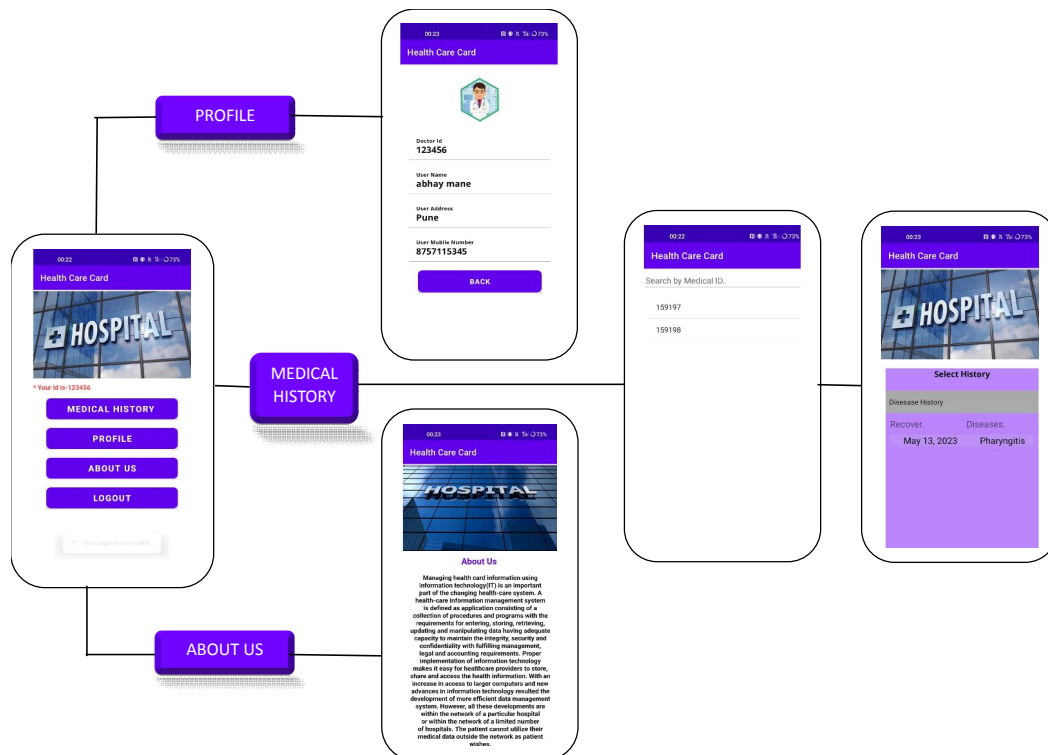
Fig: System architecture

**IV. RESULT**

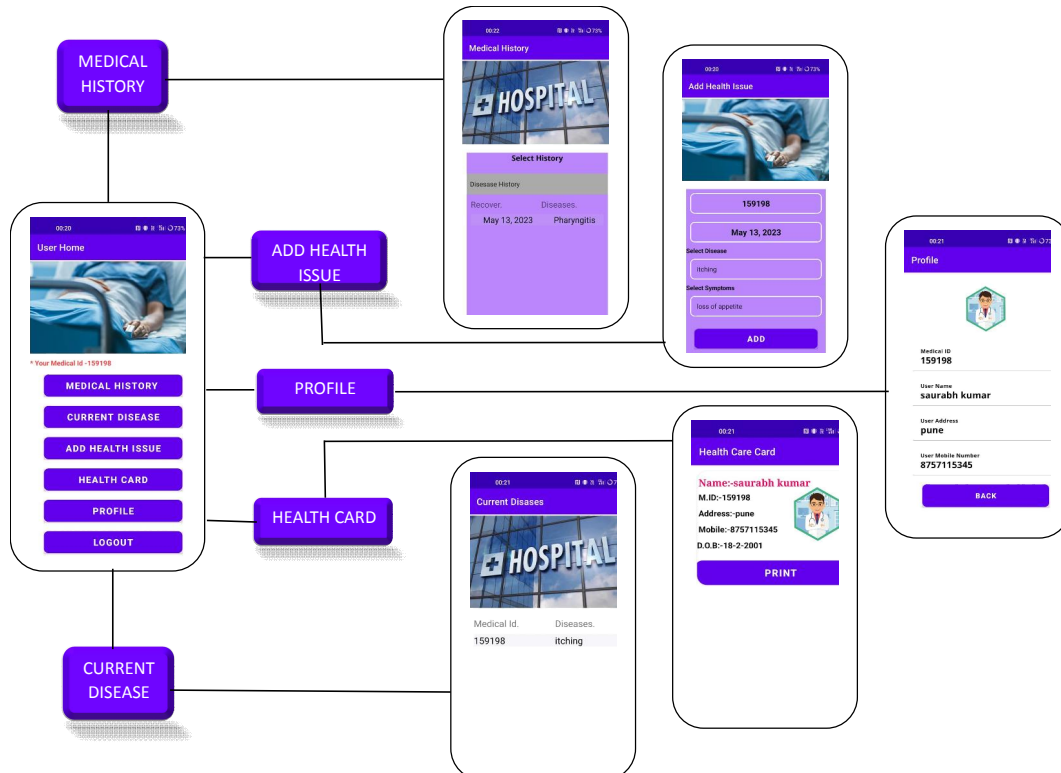
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**DOCTOR**



**USER**





## V. CONCLUSION

We proposed general disease prediction system based on machine learning algorithm. We utilized DNN algorithms to classify patient data because today medical data growing very vastly and that needs to process existed data for predicting exact disease based on symptoms. We got accurate general disease risk prediction as output, by giving the input as patients record which help us to understand the level of disease risk prediction. Because of this system may leads in low time consumption and minimal cost possible for disease prediction and risk prediction. We can say DNN is in terms of accuracy and time

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