

## A Novel Approach of Machine Learning in Smart Health

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### Abstract:-

The modern technologies have changed the face of healthcare services but still we seem to be at back foot when it comes to prediction and prevention of diseases beforehand. The adaption of Machine Learning will play a vital role in changing the results of healthcare industry by using fact based analysis and providing necessary care that revolves around the patient records.

We present a machine learning based system that will provide complete health assistance to a person. It will search the chance of various diseases that the patient is likely to acquire based on his medical history and other specification ex. Way of life, habits ,sleeping routine, exercise pattern ,etc.[1] This model can be implemented in fields like decision support systems in health care, risk management, health analysis and disease prevention. When a user enters the various parameters related to his lifestyle and a disease, the system analyzes the degree of risk of disease in the patient. The model we propose is expected to predict accurate analysis of patient details.

Finally, [2]we provide a model which can be used for predictive analytics by implementing machine learning algorithms to predict the likeliness (chances in terms of percentage) of the user to be prone a illness.

**Keywords:-Predictive,KNN, Disease,ML**

### 1.Introduction:-

Machine learning in healthcare is one such area which is seeing gradual acceptance in the healthcare industry. Today the healthcare industry – from public health to hospital administration to research and diagnostics – is growing at a phenomenal rate as baby boomers age and medical technologies continue to provide significant smartness. ML has a potential role to play in all these areas, while helping to address one of the industry’s most pressing concerns: rising costs.

Self-driving cars, Siri, etc are some of the examples of machine learning and artificial intelligence used in the real world. Machine Learning,[3] Artificial Intelligence and the mathematical formulations can help in diagnosing various problems in the medical field. Many researchers have devoted their effort in up-bringing new methods and techniques for the healthcare. A system which predicts and helps in analyzing the health of a patient so that they can take a better care of themselves would probably help in decreasing the death ratio.Helps in Identifying Diseases and Diagnosis.

### 2.Objective of proposed methodology:-

This topic came to our mind as health is one of the most serious problems of the world. Especially in India it is a very serious issue. [3]So it is very important for us to work in this field to improve the

health conditions in India as well as in the world. Many people are not even aware about the health problems they are facing until it reaches to vulnerable condition. Our main motive is to be able to develop a technology that can not only analyze a disease but also can help taking decisions for its cure and can also predict future probability of a health related problem and the measures that should be taken to prevent those problems. Various researches had been made on predicting and analyzing risk and cure of various diseases but here in our research paper we are focusing on making an AI system that proves to be a lifetime assistant for our health that accurately analyses risk of all kinds of diseases, helps to take decisions regarding the methods to cure and prevent all types of diseases, and also to assist the person in improving his/her health.

- I. be able to develop a technology that can not only analyse a disease but also can help taking decisions for its cure.
- II. Can also predict future probability of a health related problem and the measures that should be taken to prevent those problems.
- III. An AI system that proves to be a lifetime assistant for our health.

## 2.2. Proposed Method:-

It is believed that the coming era is the era of Artificial Intelligence as it is proving its scope in almost every field. It has also sent vast waves in the field of healthcare, even concluding to the fact that AI doctors will even replace human doctors in the coming future.[5] But, we do not goal on the complete replacement of human physicians rather we goal on providing them every possible help and assistance to take the best possible decisions regarding the methods to cure and prevent diseases as human touch will always be required. All these researches and analysis

on different perspective is possible only because of the presence of datasets on all kinds of diseases.[6]

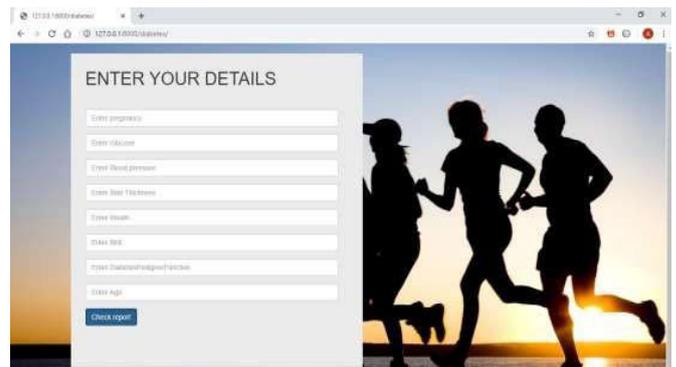
## 3.1. Methodology

### 3.1.1. Login/Signup Module:

This is the first step wherein the user can login/signup to the system through his/ her credentials. The login credentials are stored in the my sql database through connection.

### 3.1.2. Registration/ Signup Module:

The user can register to the system by filling



the details. The user can use these credentials to further login into the system and save his/her details for further consideration.

**Diabeties check-up page:** When the user wants to check his diabetes health he clicks at the Check your Health button given below it.

Fig.3.1 Diabeties check-up page

The user is required to fill all the details been asked to check his or her health. The fields been mentioned are.

- **Pregnancy:** In the first field, the user is required to enter the number of pregnancy occurred as pregnancy is a form of high blood sugar affecting

pregnant women.

- **Glucose:** In this field, the user is required to enter the glucose level in mg/dl.
- **Blood Pressure:** In this field, the user is required to enter the blood pressure level in mm HH.
- **Skin Thickness:** Skin thickness is primarily determined by collagen content and is increased in insulin-dependent diabetes mellitus.
- **Insulin:** Insulin is a hormone that your pancreas makes to allow cells to use glucose. The user is required to enter his or her insulin.
- **BMI:** BMI known as Body Mass Index. Body mass index (BMI) is a value derived from the mass (weight) and height of a person. The user is required to enter his or her body mass index.
- **betespedigreefunction:** Diabetes pedigree function is a function which scores likelihood of diabetes based on family history. The user is required to enter his or her diabetes pedigree function.
- **Age:** In the last field, the user is required to enter his or her age in years.

### 3.2.1 Applying machine learning to the data and predicting the disease:

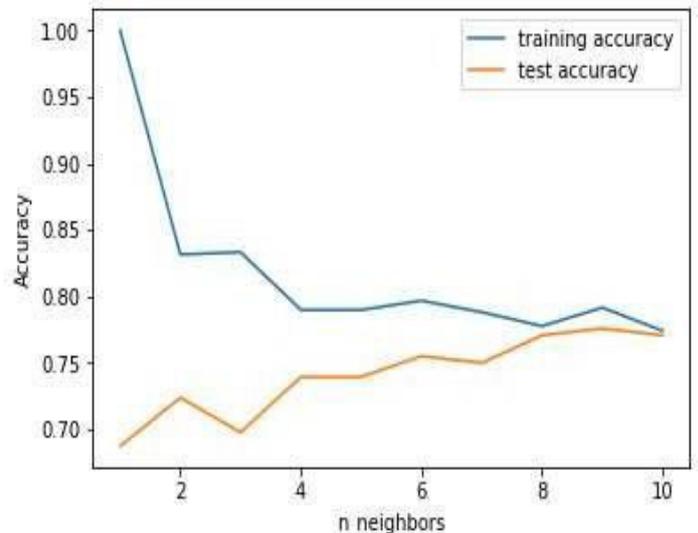
In this step we apply machine learning on the previous datasets present on a particular disease and train our model by those datasets. Then we give the person's symptoms to the model to analyse the risk or probability of disease. There are various machine learning algorithms present to do this task. According to some surveys cardiovascular diseases, cancer, diarrhoea, chronic respiratory and diabetes etc. have been a major cause of deaths in India. Some of the machine learning algorithms we have applied to predict probability of particular disease to happen are:

### 4.-Algorithm-

The K-NN algorithm is arguably the simplest machine learning algorithm. Building the model consists only of storing the training data set. To make a prediction for a new data point, the algorithm finds the closest data points in the training data set — its “nearest neighbors.”

On applying the KNN algorithm we found the accuracy between the training and the test set

Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	DiabetesPedigreeFunction	Age	Outcome
0	6	148	72	35	0 33.6	0.627	50	1
1	1	85	66	29	0 26.6	0.351	31	0
2	8	183	64	0	0 23.3	0.672	32	1
3	1	89	66	23	94 28.1	0.167	21	0
4	0	137	40	35	168 43.1	2.288	33	1



[4]

The above plot shows the training and test set accuracy on the y-axis against the setting of n-neighbors on the x-axis. Considering if we choose one single nearest neighbor, the prediction on the training set is perfect. But when more neighbors are considered, the training accuracy drops, indicating that using the single nearest neighbor leads to a model that is too complex. The best performance is somewhere around 9 neighbors.

The plot suggests that we should choose n-neighbors=9. Here we are: **fig.4.1. Test Plotting**

### Fig.4.2.Accuracy of KNN

Accuracy of KNN classifier on training set=.79

Accuracy of KNN classifier on test set=.78

### 5. Result Analysis-

We practiced a wide array of machine learning models for classification and regression, what their advantages and disadvantages are, and how to control model complexity for each of them. After finding the accuracy of different models, we then chose the model with highest accuracy.

The diabetes data set consists of 768 data points, with 9 features each.

#### Fig.5.1. Daibeties Dataset

“Outcome” is the feature we are going to predict, 0 means No diabetes, 1 means diabetes. Of these 768 data points, 500 are labeled as 0 and 268 as 1:

```
Outcome
0      500
1      268
dtype: int64
```

Figure 5.2.The variation of the outcome

```
In [10]: knn = KNeighborsClassifier(n_neighbors=1)
knn.fit(X_train, y_train)
print('Accuracy of K-NN classifier on training set: {:.2f}'.format(knn.score(X_train, y_train)))
print('Accuracy of K-NN classifier on test set: {:.2f}'.format(knn.score(X_test, y_test)))
```

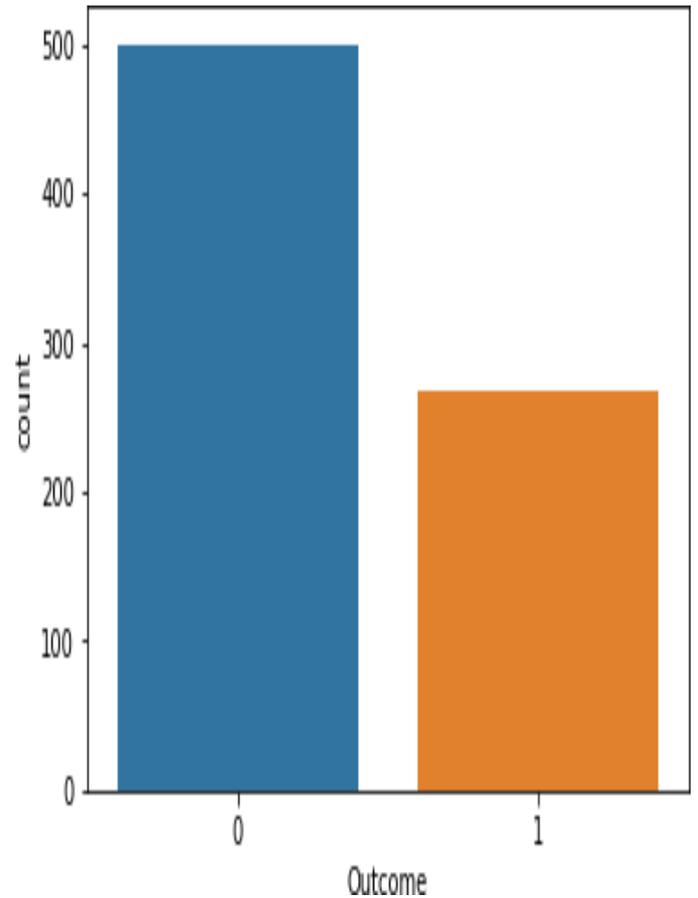


Fig.5.3.Plot showing distribution of the outcome

### 5.Conclusion :-

Required clinical symptom related information can be obtained from historical knowledge in the suggested methodology by planning datasets using SVM algorithm. These datasets will be compared with the incoming queries and an Association Rule Mining Report will be generated. Given that this new solution will be based on real historical data, it would provide accurate and prompt results that

would allow patients to get an urgent diagnosis. WebApplication such as sending a doctor remotely for a chat session are often provided so that patients can speak directly with physicians. As a result, in the true sense, this web system will be predictable and also produce high accuracy with fairness.

## 6.Future Scope

Medical diagnostic reasoning is a completely vital software place of shrewd structures. In this framework, professional structures and model-primarily based totally schemes offer mechanisms for the technology of hypotheses from affected person information.

- I. Improving Performance:
- II. Personalized Medicine:
- III. Empowering Health Sector:
- IV. Treatment Using IoT and Robotics .

Automatic detection of blood glucose and injecting insulin whilst wanted with out stressful user's lifestyle. A device which detects the doze of antibiotics to be wanted as consistent with affected person's food regimen and sleep. Combing the visible information and motor styles in a tool that could assist in wearing out a hit surgery

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