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Disease Prediction and Hospital Recommendation using Machine Learning Algorithms

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Abstract: ***The health care industry collects data from the patient's database by applying data mining and machine learning techniques is used to predict the disease where disease is the leading cause for the human's death from the past years. Medical profiles or pathological data where it has been extracted from the data mining technique has been used to predict the specific disease like heart disease, cancer disease, diabetes disease and tried this approach to predict the recurrence of disease. Nowadays these three diseases are common in people's health where they are suffering badly in a critical condition to live their life. Technology has been more advanced in health industry to give solutions for the patients by giving suggestions of doctors and hospitals where to admit and which doctor need to be consulted for the particular disease. We are implementing this in our application by predicting the doctors and hospitals with positive and negative reviews collected by the patient's and guardians based on their ratings.***

Keywords: Machine Learning, Disease Prediction

I. INTRODUCTION

Health plays a major role in human's life to lead a peaceful life but people are stepping into many diseases due to deficiency in nutrients and food. In modern technology we are creating application where we will be predicting the diseases and recommending the best hospitals and doctors based on the patient's reviews. Patient's satisfaction is one of the best valid indicator for the doctors and the hospitals where they care for quality and each and every patients review is more important to give a best result. Many health care providers will be fetching the patients inputs and they analyse the data of patients reviews and personally they will collect data from the doctor's office, clinics, hospitals and they will record the patients experience to evaluate doctor's performance and hospital services and management. The set of data is analysed by using random forest algorithm and K-nearest neighbors (KNN) algorithm where it approaches the problem with a specified question to analyse and find the solution between two or more independent variables and dependent variables. They will do the survey and compute the answers received from the patients and they convert into percentage based on the hospital services or management. Disease is causing major health issues in people's life. To overcome this problem, we are inventing new ideas in this application by predicting the diseases based on the data sets collecting from the patients. We are mainly concentrating on three diseases like heart disease, cancer disease and diabetes disease where these three diseases are commonly found in people's health and giving major issues with critical condition. Generally, scientists doing research on these diseases to find a solution. We also trying to resolve this issue by implementing new ideas by using machine learning technique. We will be collecting data from the patient for a particular disease and gives recommendation on hospitals and doctors to consult. For example, it is necessary to record the details of most important symptoms and health habits that contribute to heart disease where it leads to heart attack and strokes. Various test is to be performed prior to diagnosis of heart disease, including auscultation, ECG, blood pressure, cholesterol and blood sugar.

For cancer disease various tests is to be performed according to the type of cancer most important symptoms will be recorded. Last but not least is diabetes disease, this also has several tests to be taken like fasting plasma glucose(FPG) and random plasma glucose(RPG). Depending upon these surveys we will predict, the patient has which disease? and according to that for a particular disease we will predict the best and suitable hospital for the patients which helps them easily to get admit into it.

II. RELATED WORKS

Hospital Consumer Assessment of Healthcare Providers and Systems [HCAHPS] [1] is a standard survey instrument used by many hospitals to evaluate patients 'experience. This data is provided by the Hospital Consumer Assessment of Healthcare Providers and Systems database, which is funded by U.S agency for health care research.

The centres for Medicaid and Medicare services use the scores from Hospital Consumer Assessment of Healthcare providers and systems to reimburse hospitals for patient care. Providing a high quality care is directly related to a hospital's revenue and many hospitals are looking for ways to improve patient experience and achieve a higher HCAHPS score.

This survey gives brief description of the satisfaction questions on the HCAHPS survey instrument and the categories that they fall into. The survey questions are divided into six sections where each section has a number of multiple choice questions.

For instance, the section on "care from doctor" measures patient satisfaction with the care provided by doctor(s) using three questions about doctor's respect, listening, and explaining. Each question has four choices (Never, Sometimes, Usually, and Always).

Sheetz et al [5] investigated the relationship between postoperative morbidity and mortality and patients' perspectives of care in surgical patients. In their article, the overall satisfaction score is used along with Michigan Surgical Quality Collaborative clinical registry as a measure of patients' perspective of care. Quite a few studies have explored specific relationships between a single satisfaction question and one or more of patients' demographic information.

Goldstein et al. [6] conducted an analysis of racial/ethnicity in patients' perceptions of inpatient care. Using regression, they concluded that non-Hispanic Whites on average tend to go to hospitals that deliver better patient experiences to all patients as compared to the hospitals that are typically used by African American, Hispanic, Asian/Pacific Islander, or multiracial patients [6].

Elliot et al [7], analysed the association of gender with different aspects of satisfaction and in a separate study, analysed hospital ranking variation with patient health status and race/language and slightly with patient's education and age [8]. Klink Enberg [9] explored the relation between the willingness to recommend the hospital and other satisfaction identifiers. This paper discovers that hospitals that focus resources on improving interpersonal aspects of care such as nurses and doctors' courtesy, respect, listening, room cleanliness, etc. will be most likely to see improvements in satisfaction scores.

The paper does not consider patients' demographic data. The existing literature on analysis of the HCAHPS dataset is mostly hypothesis-driven and only considers specific aspects of patient satisfaction or demographics. In contrast, the methodology presented in this paper does not assume any specific hypothesis.

Instead, we run a data-driven exploratory analysis which inspects all aspects of patient satisfaction as well as patient demographics and discovers interesting associations in the HCAHPS dataset.

III. DATA AND METHODOLOGY

A. *Existing System*

Several online health care system has invented new ideas to benefit people and so many online applications have features to give recommendations on hospital and doctors. But they have lack of reliability and accuracy where they need to do improvisations in the features and modules.

Genuinely health care systems might not upload the opinions of people in some cases for the negative response and by doing manually while collecting feedbacks from the patients, might be patients hesitate to give complete opinion of doctors or hospitals in front of persons where we will find the lack of quality. In total we have not found all features and modules at a time in one application and there are different types of applications for different type of diseases where they have different applications separately for doctors and hospitals to give recommendations.

B. *Disadvantages of Existing system*

1) Difficulties in finding the best doctors for a particular disease.

2) Tough to discover the hospitals based on the recommendation.

C. *Proposed System*

In this research we have found the solution for the issues facing in existing system where we have proposed the accuracy, reliability and efficiency by developing the features of three diseases called Heart disease, cancer disease and diabetes where we will find most common diseases in people health and we have installed in one application with prediction of three diseases by analysing the symptoms collected from the patient's record and taking positive and negative opinions from patient's according to that we will give ratings to the hospitals and doctors from best to worst. Guardians opinions is also very much important and they can give feedback of them like how they were treating their patients? Was it friendly or strictly? and how the hospital management is? Was it clean? How is the hospitality?

When the feedback comes to online so that patients and guardians can give both positive and negative opinions completely without any hesitation. Based on that we can provide truthful recommendations of hospital and doctors for the people and can predict the results. According to that prediction of particular disease we will predict best suitable hospital and doctor to consult and to get admit into it.

D. Advantages Of Proposed System

1) Easy way of accessing the application with best recommendations on both hospitals and doctors.

2) Application has multiple options to make decision easily on diseases.

IV. IMPLEMENTATION DETAILS

System Architecture design-identifies the overall hypermedia structure for the WebApp. Architecture design is tied to the goals establish for a WebApp, the content to be presented, the users who will visit, and the navigation philosophy that has been established. Content architecture, focuses on the manner in which content objects and structured for presentation and navigation. WebApp architecture, addresses the manner in which the application is structure to manage user interaction, handle internal processing tasks, effect navigation, and present content. WebApp architecture is defined within the context of the development environment in which the application is to be implemented

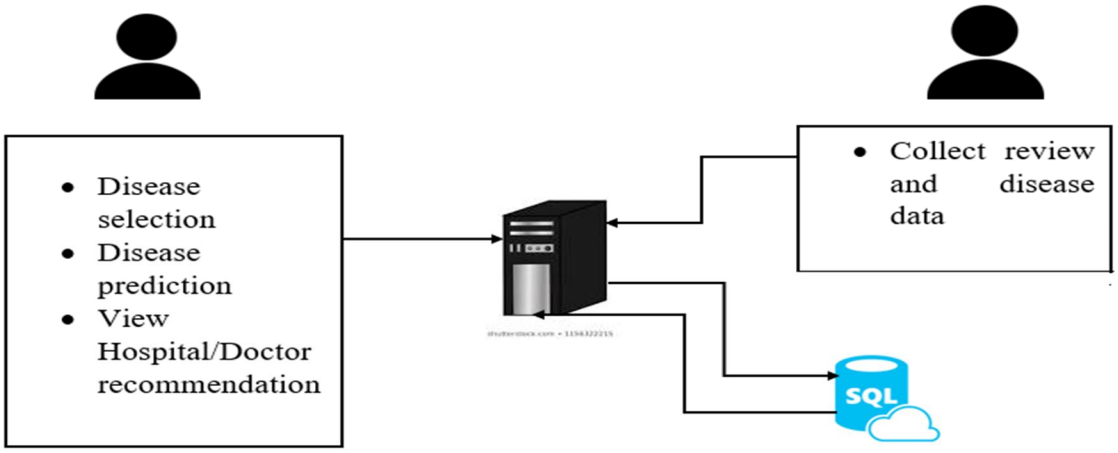

Fig:1 Input / Output Design

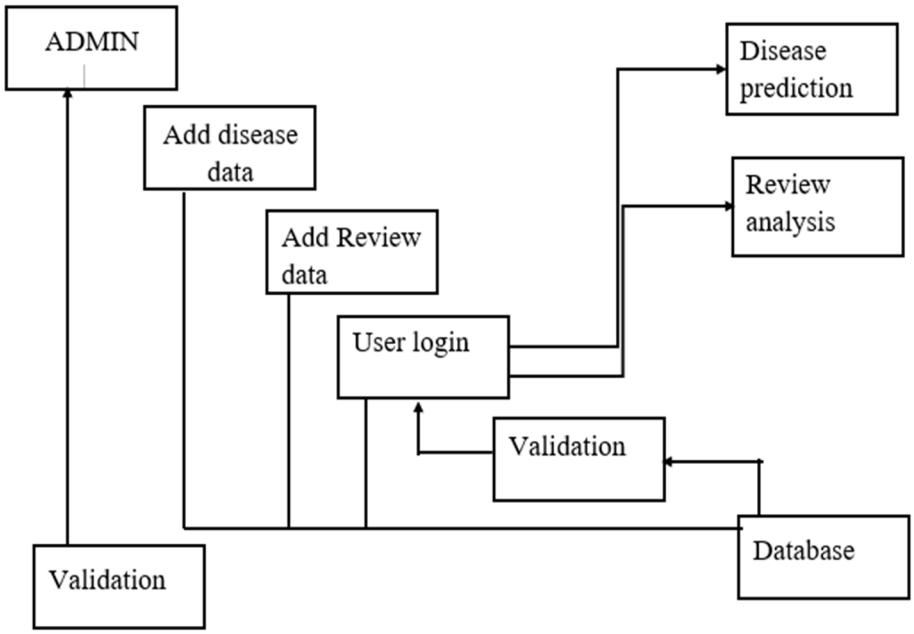

Fig:2 Input/output design

In an information system, input is the raw data that is processed to produce output. During the input design, the developers must consider the input devices such as PC, MICR, OMR, etc. Therefore, the quality of system input determines the quality of system output. Well-designed input forms and screens. The design of output is the most important task of any system. During output design, developers identify the type of outputs needed, and consider the necessary output controls and prototype report layouts.

A. Flow Diagram

It is important to complete all tasks and meet deadlines. There are many project management tools that are available to help project managers manage their tasks and schedule and one of them is the flowchart.

A flowchart is one of the seven basic quality tools used in project management and it displays the actions that are necessary to meet the goals of a particular task in the most practical sequence. Also called as process maps, this type of tool displays a series of steps with branching possibilities that depict one or more inputs and transforms them to outputs.

The advantage of flowcharts is that they show the activities involved in a project including the decision points, parallel paths, branching loops as well as the overall sequence of processing through mapping the operational details within the horizontal value chain. Moreover, this particular tool is very used in estimating and understanding the cost of quality for a particular process. This is done by using the branching logic of the workflow and estimating the expected monetary returns.

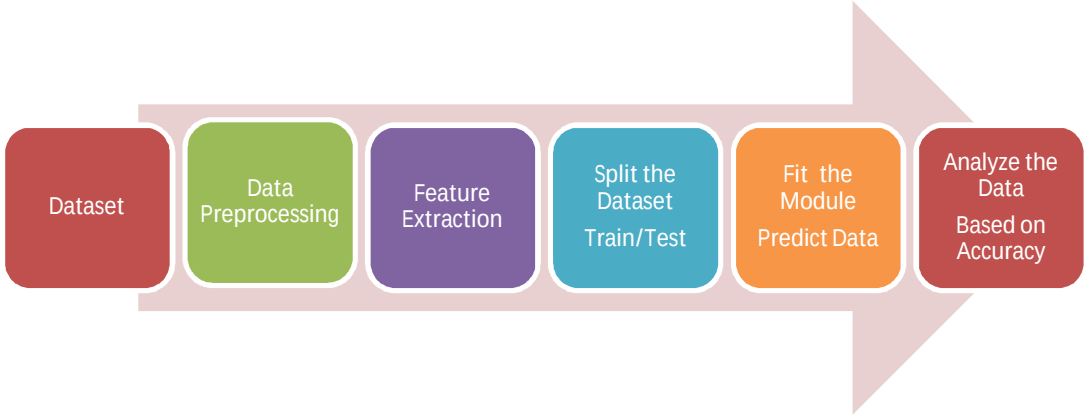

Fig. 3 Flow chart

V. RESULTS AND CONCLUSION

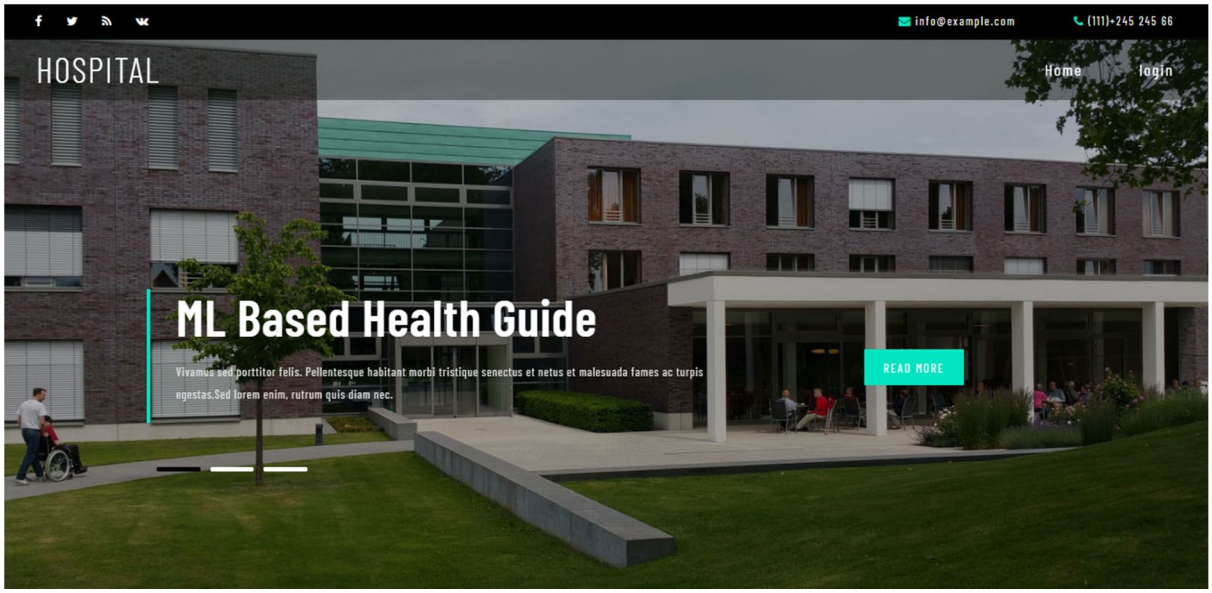

Fig 5.1: Home page

This is the Home page of Hospital and doctor Recommendation. Here we have brief information about hospitals and w have login tab in the home page

Fig: 5.2 Sign up

This is the sign up page where user need to sign up before sign in by providing the information like full name email password and phone number.

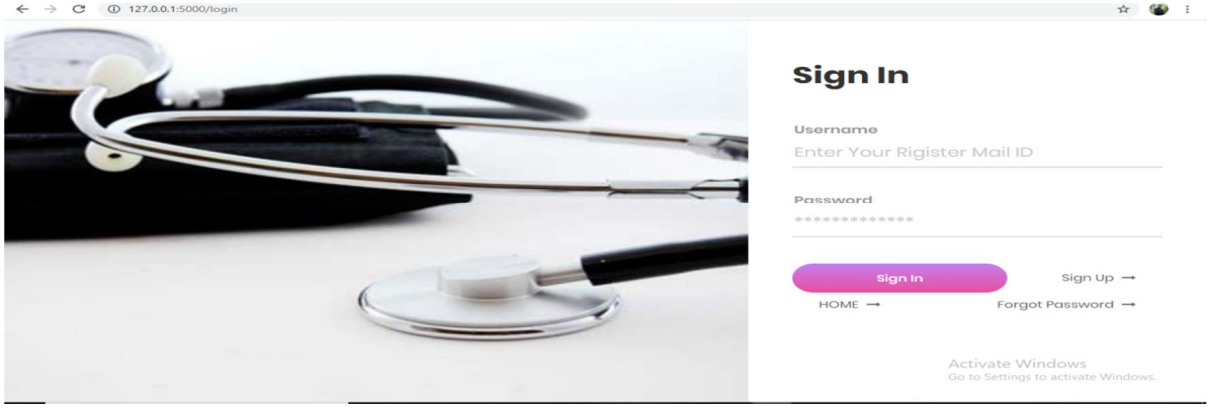

Fig: 5.3 Sign in page

This is the sign in page where user need to sign in by providing username and password which has been given at the time of sign up. In case if you user password there is a option to retrieve the password by clicking forgot password option

Fig: 5.4 Forget password

This is the page where user forgot the password and by filling the email and submit he can retrieve the password from the email

Fig: 5.5 Admin page

This is the admin login where admin login through there username and password.

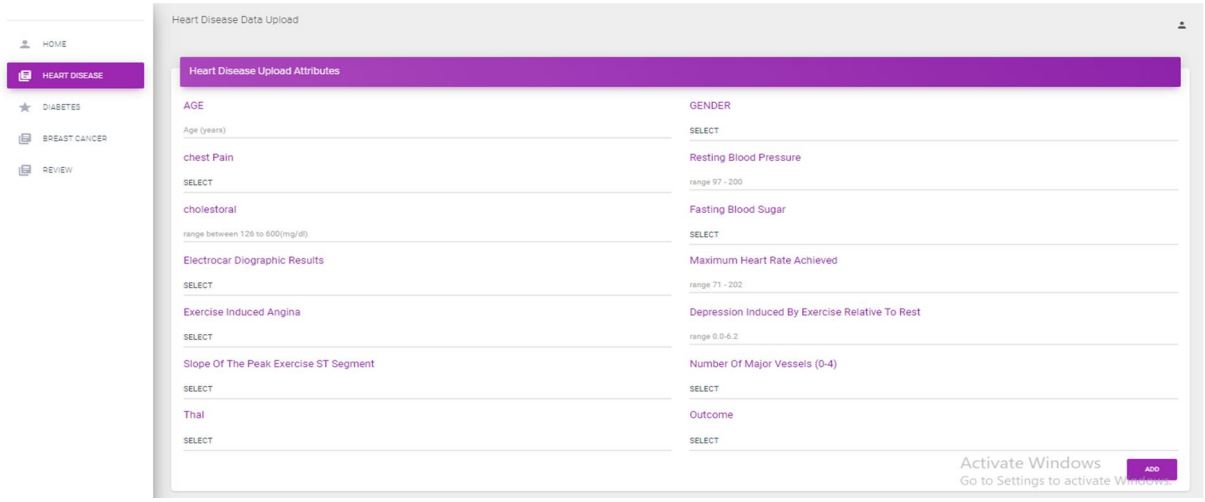

Fig: 5.6 Heart disease data Upload

This is the page where the heart disease data upload page. where admin add the information to data base.

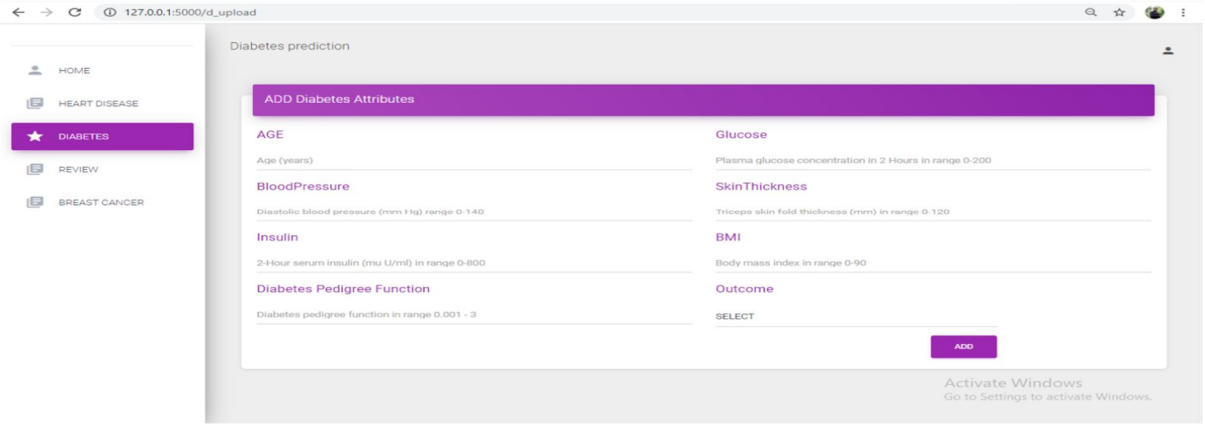

Fig 5.7 Diabetics Disease Data Uplode

This is the page where the Diabetes disease data upload page. where admin add the information to data base

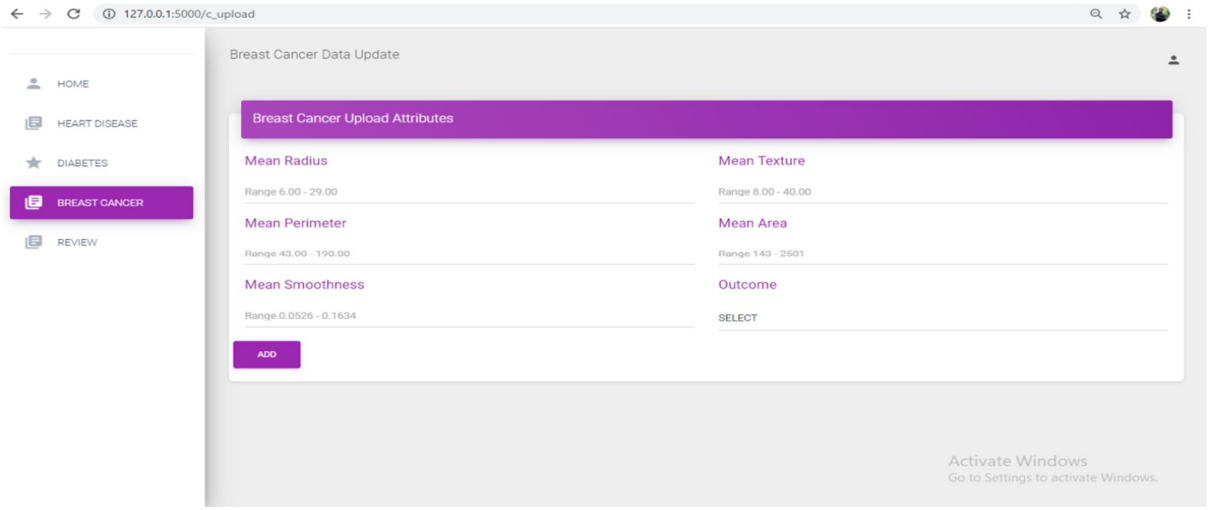

Fig 5.8 Breast cancer disease data uplode

This is the page where the Breast cancer disease data upload page. where admin add the information to data base.

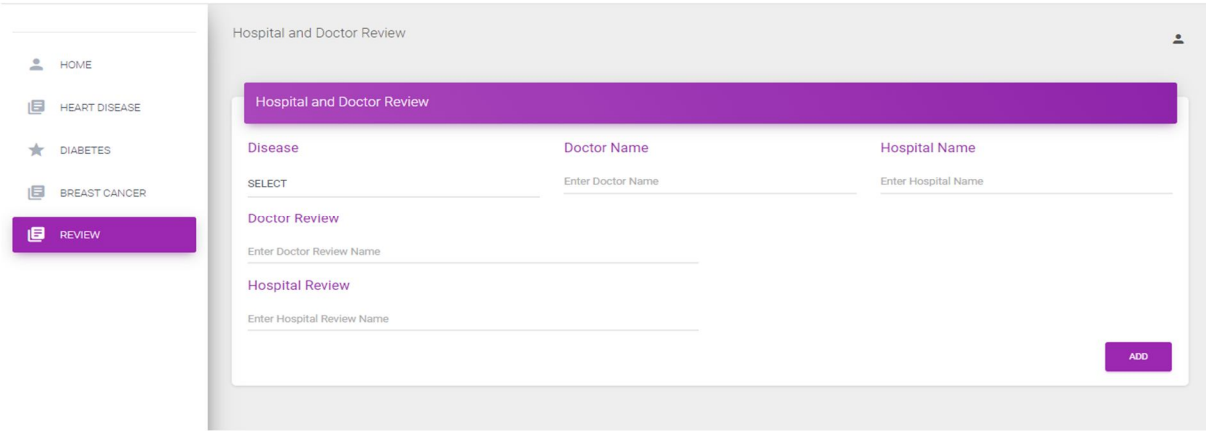

Fig 5.9 Review

This is the page where Admin uploads the Hospital and doctor reviews

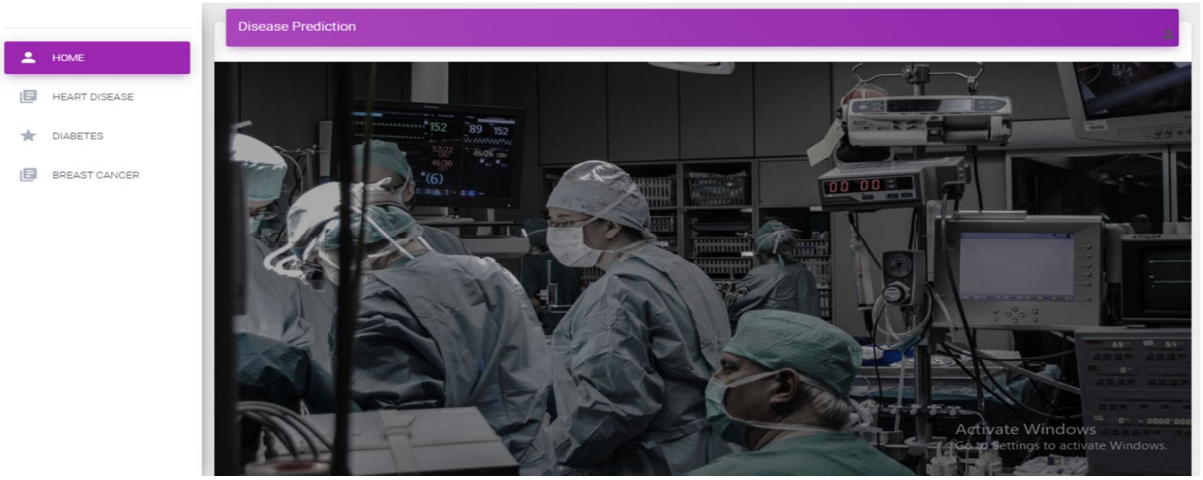

Fig 5.10 User Login

This Is the user login page where we get three types of disease that is heart, diabetes, and breast cancer. Here user can select the particular disease based on there requirements.

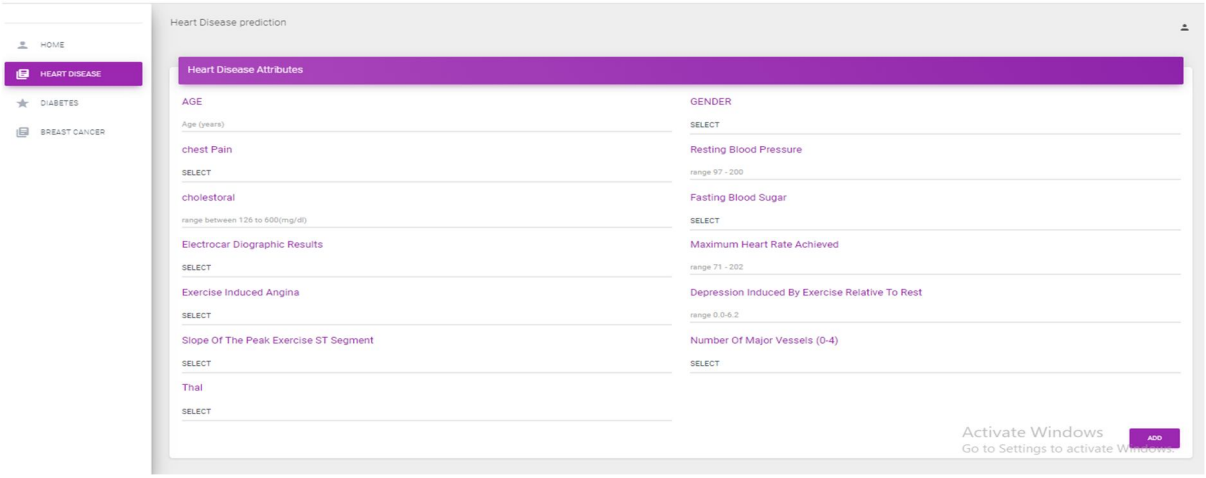

Fig 5.11 Heart Disease

This is the page where user needs to fill the attributes reference through the report

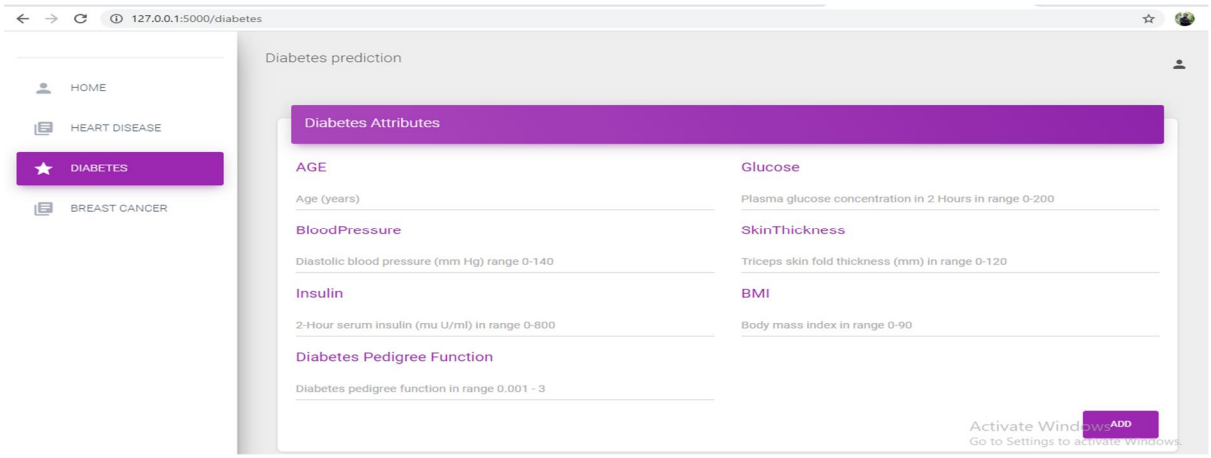

Fig 5.12 Diabetes

This is the page where user needs to fill the attributes reference through the report

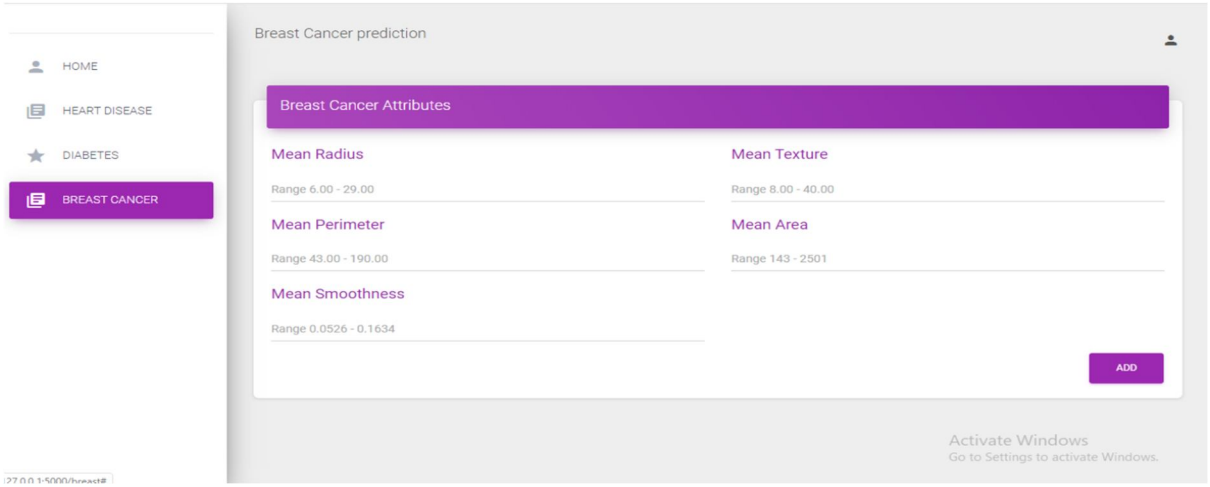

Fig 5.13 Breast cancer

This is the page where user needs to fill the attributes reference through the report

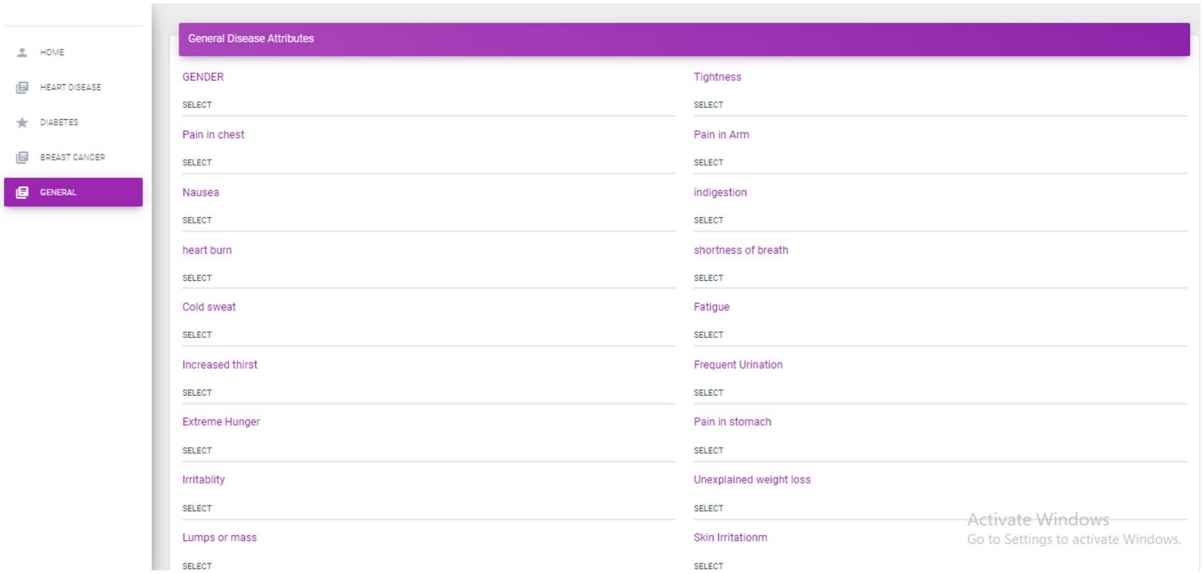

Fig 5.14 General

This is the page where general attribute selection of the disease

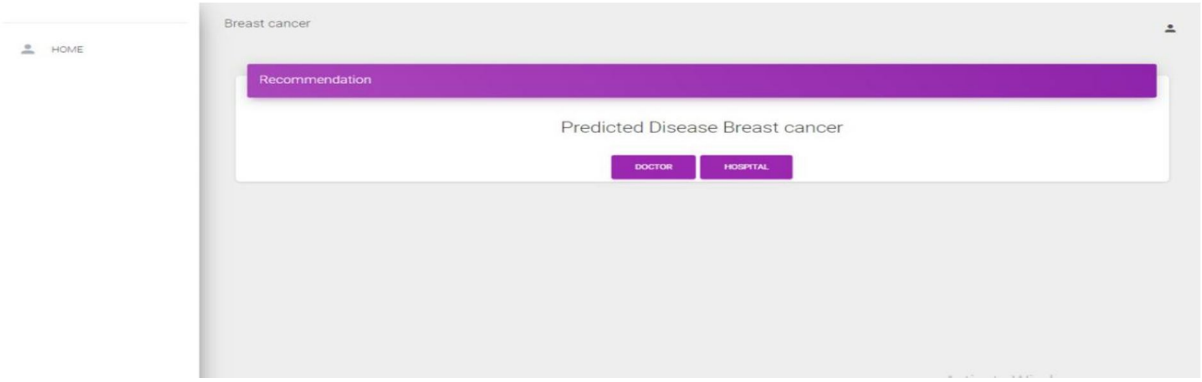

Fig 5.15 Disease prediction

This is the prediction page after filling all the information it predicts the disease with positive or negative. And we get two options so that it helps to view best doctor and hospital for that particular disease.

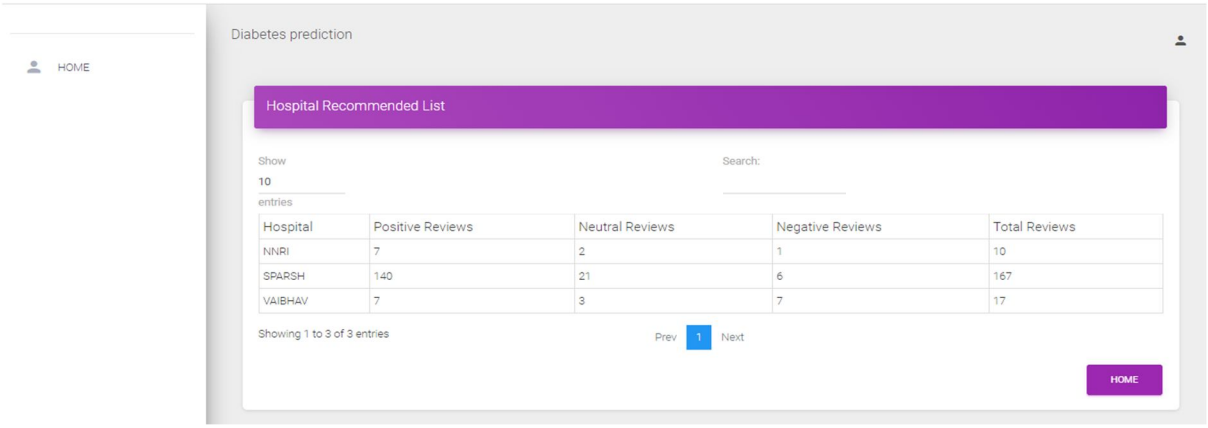

Fig 5.16 Hospital Recommendation

This is the page with Hospital recommendation list with positive and negative review of the hospitals.so that user can easily select there hospitals based on there positive and negative reviews

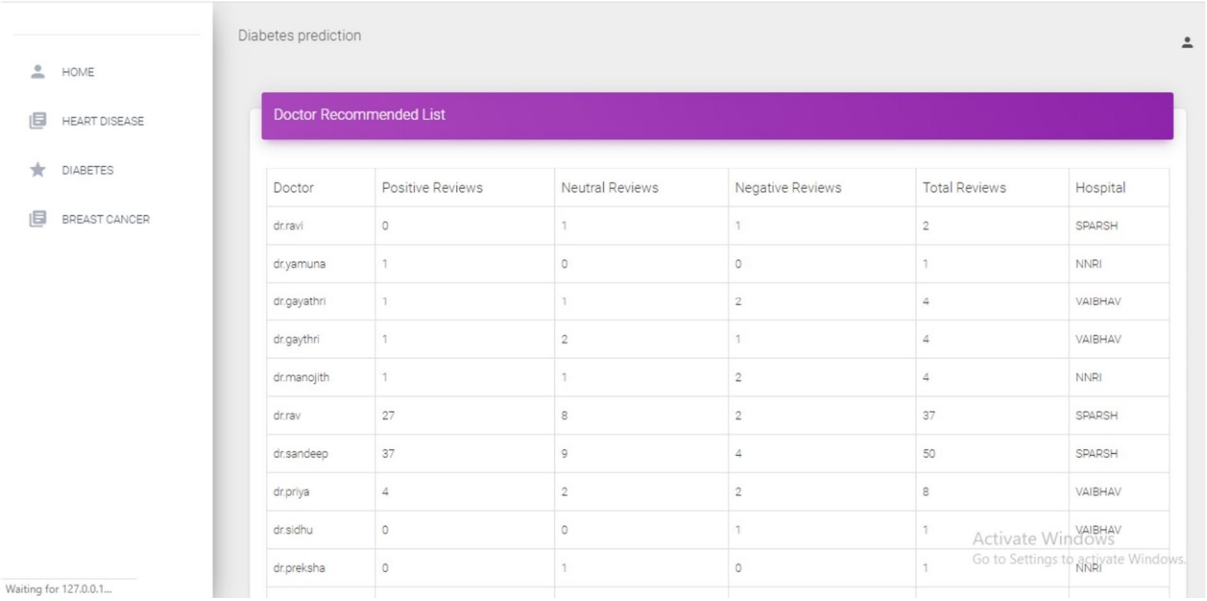

Fig 5.17 Doctor Recommendation List

This is the page with Hospital recommendation list with positive and negative review of the hospitals.so that user can easily select there hospitals based on there positive and negative reviews.

VI. CONCLUSION

In earlier days in hospitals they need to perform various tests and should wait for one day for all the related lab reports where it leads to abortive and efficiency, accuracy is less. We have tried the application in an effective way in reducing dimensionality, eliminating irrelevant data, increasing learning accuracy and improving by understanding of results and focusing on three diseases where commonly found in people's health in addition to that we are forecasting the best hospitals and doctors for a peculiar disease which helps a lot and in an easier way patients can find the hospitals with good quality care of doctors.

In total we are implementing our innovation ideas to give benefits to the people who are suffering from the health issues and they can make use of this application where they will find all good options at a time in one appeal. Opinions given by people on hospitals and doctors plays an important role and easily they can make decision. The goal was to use such associations to create a patient satisfaction based the recommendation system for hospitals.

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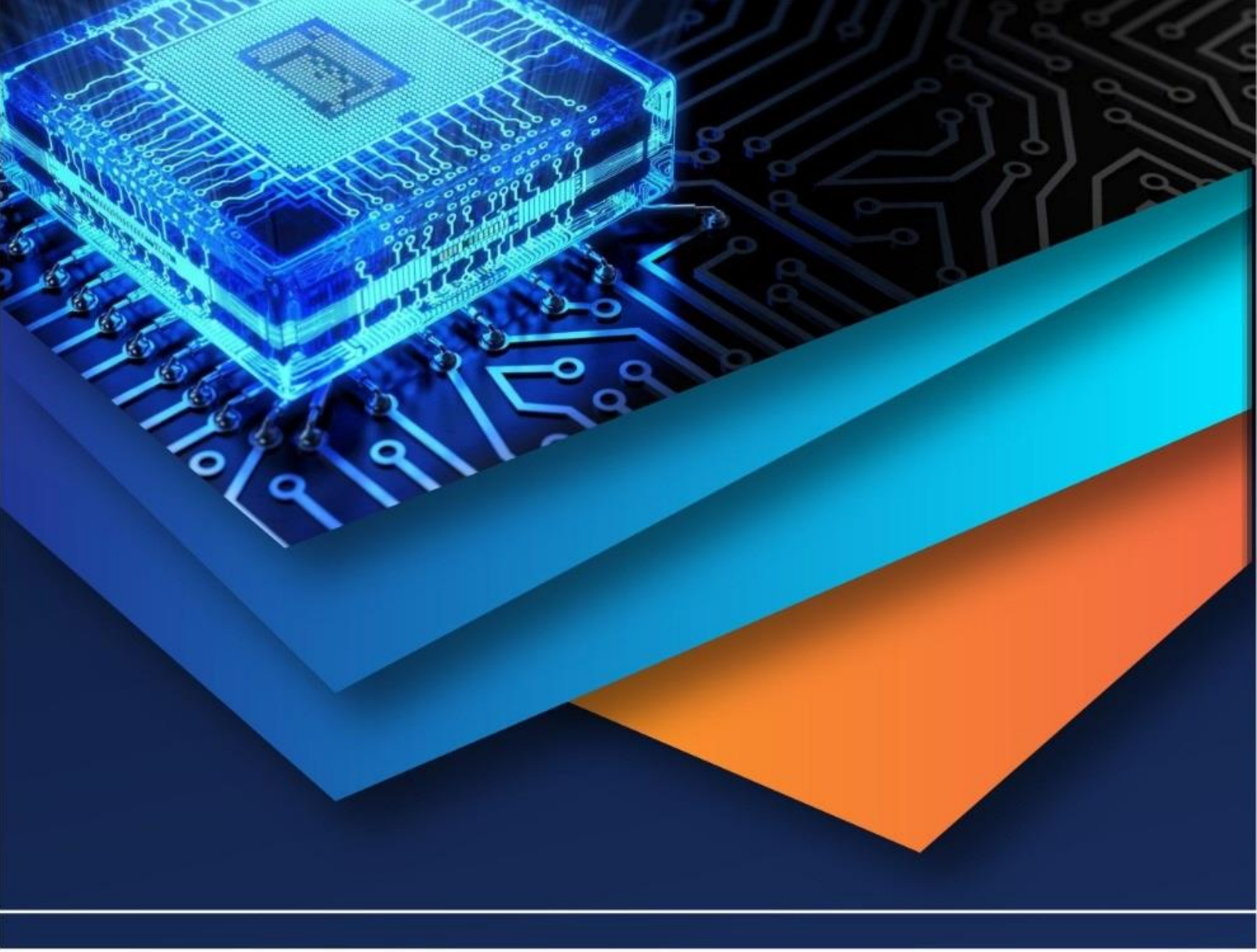

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