processes. Although corpulmonale commonly has a chronic and slowly progressive course, acute onset or worsening corpulmonale with life-threatening complications can occur.

5. Cardiac Dysrhythmia

A cardiac dysrhythmia is an abnormal heart beat: the rhythm may be irregular in its pacing or the heart rate may be low or high. Some dysrhythmias are potentially life threatening while other dysrhythmias (such as sinus arrhythmia) and normal. Includes Diseases: Bradycardia

Data Mining

Definition: In simple words, data mining is defined as a process used to extract usable data from a larger set of any raw data. It implies analysing data patterns in large batches of data using one or more software. Data mining has applications in multiple fields, like science and research. As an application of data mining, businesses can learn more about their customers and develop more effective strategies related to various business functions and in turn leverage resources in a more optimal and insightful manner. This helps businesses be closer to their objective and make better decisions. Data mining involves effective data collection and warehousing as well as computer processing. For segmenting the data and evaluating the probability of future events, data mining uses sophisticated mathematical algorithms. Data mining is also known as Knowledge Discovery in Data (KDD).

Description: Key features of data mining:

• Automatic pattern predictions based on trend and behaviour analysis.

• Prediction based on likely outcomes.

• Creation of decision-oriented information.

• Focus on large data sets and databases for analysis.

• Clustering based on finding and visually documented groups of facts not previously known.

The Data Mining Process: Technological Infrastructure Required:

1. Database Size: For creating a more powerful system more data is required to processed and maintained.

2. Query complexity: For querying or processing more complex queries and the greater the number of queries, the more powerful system is required. Uses:

    1. Data mining techniques are useful in many research projects, including mathematics, cybernetics, genetics and marketing.

2. With data mining, a retailer could manage and use point-of-sale records of customer purchases to send targeted promotions based on an individual's purchase history. The retailer could also develop products and promotions to appeal to specific customer segments based on mining demographic data from comment or warranty cards.

PROPOSED SYSTEM AND IMPLEMENTATION

The suggested system is a web-based application system for heart disease prediction that has the potential to address the issue of the linked heart disease. This will be made feasible by the system's interactive nature; as a result, patient-computer interaction will take the place of patient-doctor engagement in this system. The username and password are sent by the web application to the server, where they are then processed to authenticate the application's credentials by verifying the username and password that have been registered with the server. If the destination exists, the information is then processed and delivered there. The user is supposed to choose from a list of heart disease symptoms when the system is consulted, including wheezing, chest discomfort, shortness of breath, diabetes, weariness, and obesity. It performs a diagnosis by consulting its knowledge base, which has certain pre-programmed indications and symptoms linked to particular specific illnesses, helpful resources, the name of the illness, and a medication prescription for it.

PROPOSED SYSTEM METHODOLOGY

A **methodology** is a collection of Procedures, Tools and Documentation aids in Software Process model. The relevance of expert system software in the healthcare industry is continually expanding, and with that rise comes an increase in the size of the software systems and the impacts of their growth. These factors have an impact on the methods that may be used to produce it. Software development for expert system projects requires a great deal of skill and time, both of which must be precisely used to provide the finished result at the lowest possible cost with the advancement of software development.

Extreme Programming (XP) Model is the methodology chosen for the system analysis. XP is a methodical strategy for producing high-quality software fast and consistently. It encourages intimate cooperation, strong customer participation, quick feedback loops, continuous testing, continuous planning, and frequent software delivery—typically every 1-3 weeks (Maurer and Martel, 2019). It is appropriate for small- to medium-sized projects and development teams that prioritise the finished result. XP, first introduced by Kent Beck, has become one of the most well-known and contentious agile approaches.

Some attributes Extreme Programming (XP) Model

SN	Phases	Features
1	**Requirement Analysis**: Requirement Specification	Frequently change
2	**Planning:** Cost	Expensive
3	**Design :**Overlapping Phases	Yes
4	**Implementation:** Time required	Short
5	**Maintenance phase:**	Easily

Table 1: Some attributes Extreme Programming (XP) Model

DESIGN

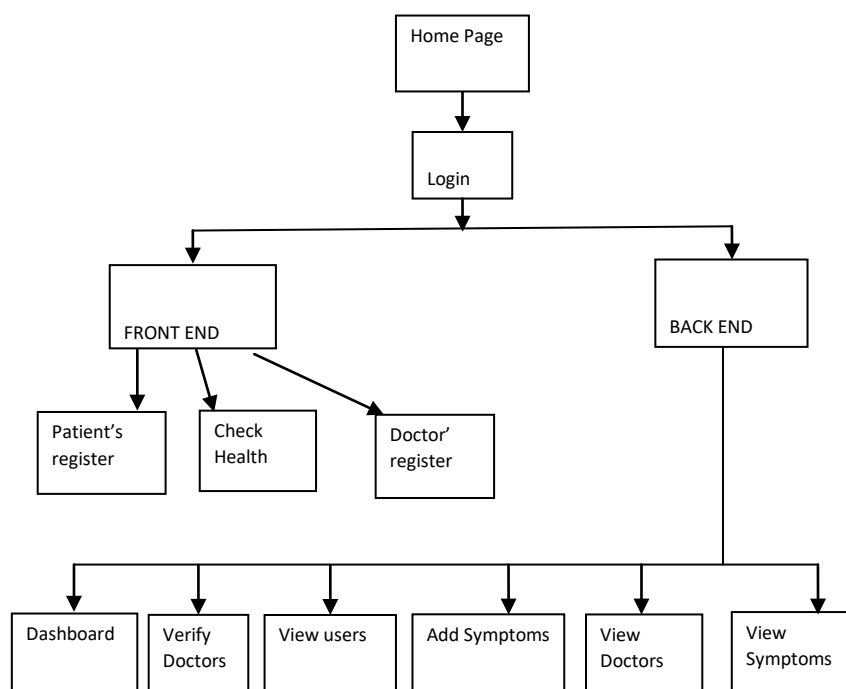**System Design-** The data flow diagram below depicts the detailed flow of events in the system.

```
                        ┌─────────────┐
                        │  Home Page  │
                        └──────┬──────┘
                               │
                        ┌──────┴──────┐
                        │    Login    │
                        └──────┬──────┘
             ┌─────────────────┴─────────────────┐
       ┌─────┴──────┐                      ┌──────┴─────┐
       │ FRONT END  │                      │  BACK END  │
       └─────┬──────┘                      └──────┬─────┘
    ┌────────┼─────────┐
┌───┴────┐ ┌─┴─────┐ ┌──┴─────┐
│Patient's│ │ Check │ │ Doctor'│
│register │ │Health │ │register│
└────────┘ └───────┘ └────────┘
```

Figure:-1 Top-down design of the system.

| Dashboard | Verify Doctors | View users | Add Symptoms | View Doctors | View Symptoms |

SYSTEM IMPLEMENTATION

The new System offers people a simple setting for diagnosing illnesses related to their heart function or other health issues. The system determines the patient's condition based on their symptoms, identifies the disease that goes along with those symptoms, and provides contact and address information for the medical doctor who can treat the condition. The system also suggests a temporary fix (First Aid) before the patient can see the doctor, allowing medical professionals to make an accurate diagnosis even from previous medical records, providing them a good understanding of how to provide medical advice or treatment

Here this my proposed Heart Disease Prediction System using Expert System is divided into three (3) main Modules

Patient Module

The patient needs to register and login. The system requires a new patient to register and an existing patient to login using his/her username and password. The patient goes for Check Health and select symptom. The patient after registration is prompted to select symptoms the patient is having and click on search thereafter.

Doctor Module:

Doctor needs to register by clicking "**Are you a Doctor?"** and then fill in the form and submit. The doctor will be consulted by patient if suspected health disorder persists after first aid treatment by Expert System.

Admin Module

Admin can login to view all the registered and verified doctors. Admin also manage Doctors, patient and other services

RESULT AND CONCLUSION

The Heart Disease Prediction System using Expert System and Data Mining has been developed to have a user-friendly interface. It employed user interface to communicate between the user and the Expert System. The interface is the technique by which the user interacts through the Expert System. The user can easily access all the application from the home page where there is a menu bar from which he/she can perform his/her desired functions. Below are some of results obtained after testing the system

Home Page
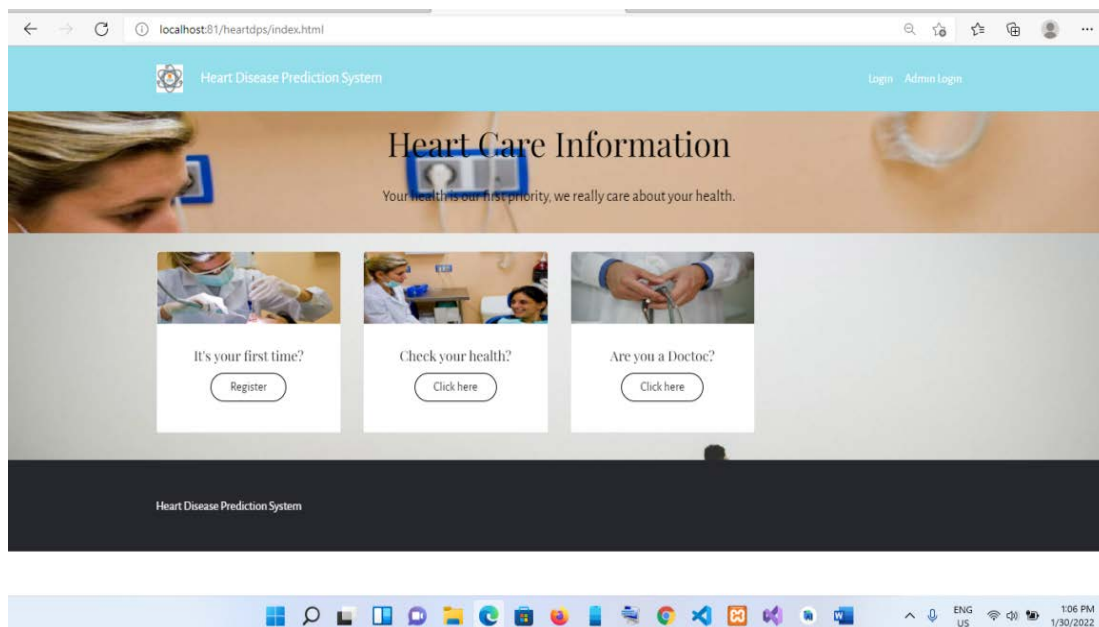
Fig 2: Heart Disease Prediction System Using Expert System and Data Mining Home Page

User's Registration

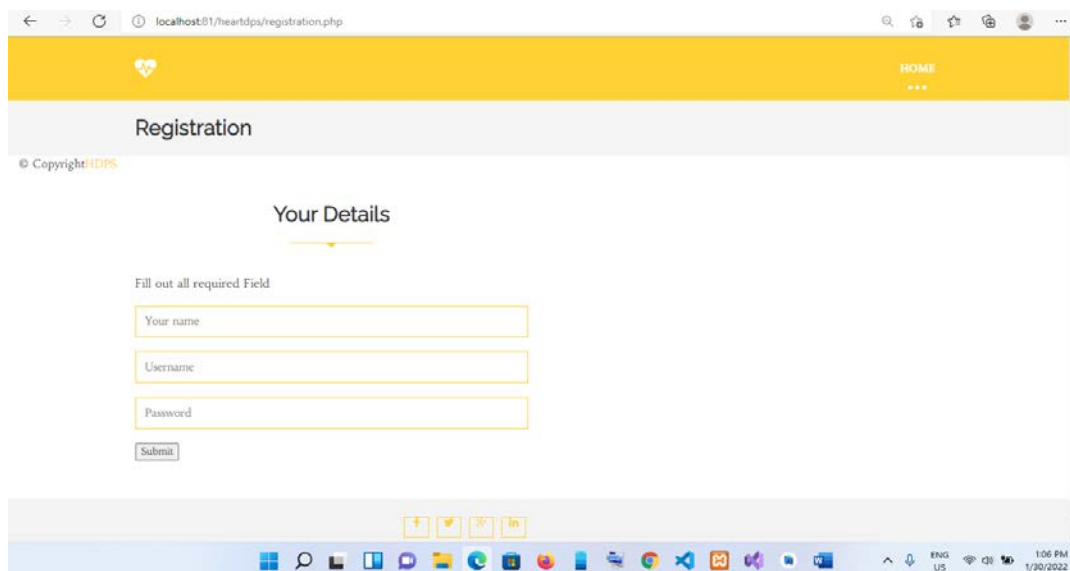This is a platform or an Interface where a new user can be registered

Fig 3: User's Registration

Doctor's Registration
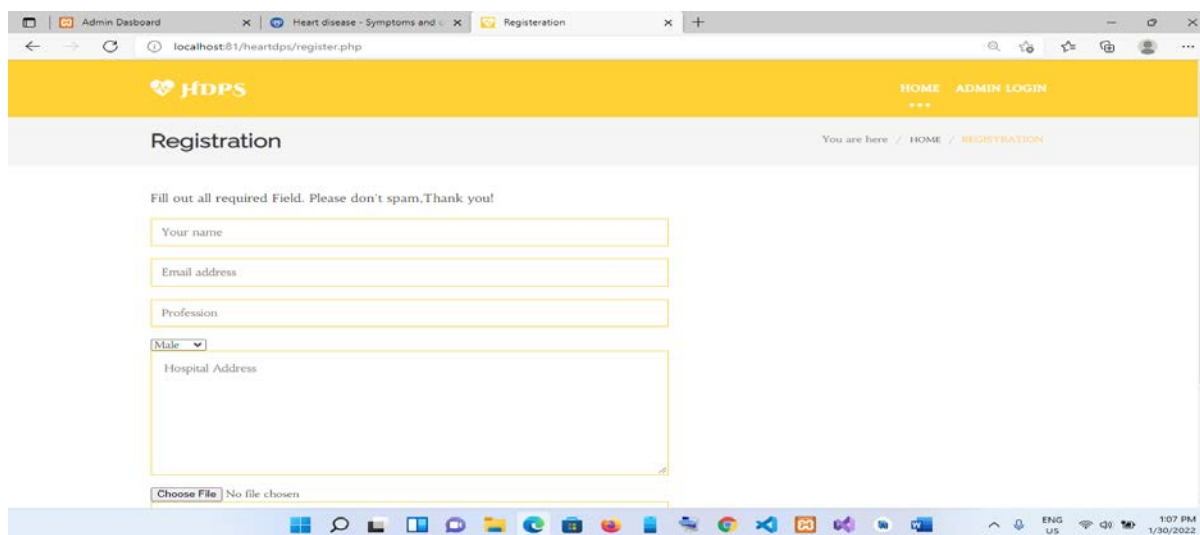
This is an interface for a doctor can be registered.

Fig 4: Doctor's Registration

User Login

Here is where the user login with registered username and Password.

Fig 5: Users Login

Admin Login

This is where admin can login to add symptoms; view all registered and verified Experts.
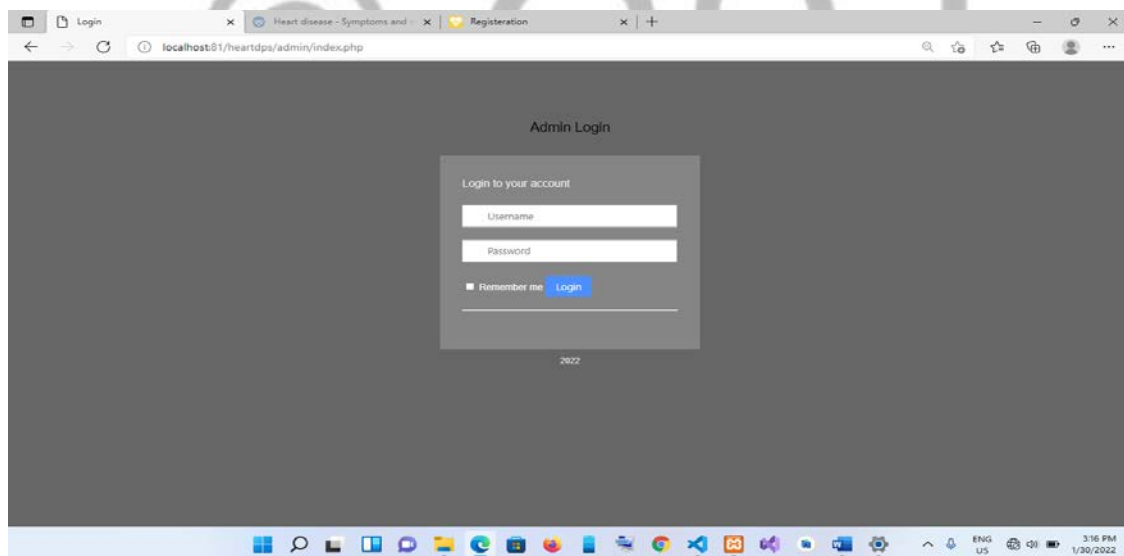Admin need to login using username and password.

Fig 6: Admin Login

Symptom Selection Page/Diagnosis input Module

This is where the patient can choose from the listed symptoms that he or she is facing. This
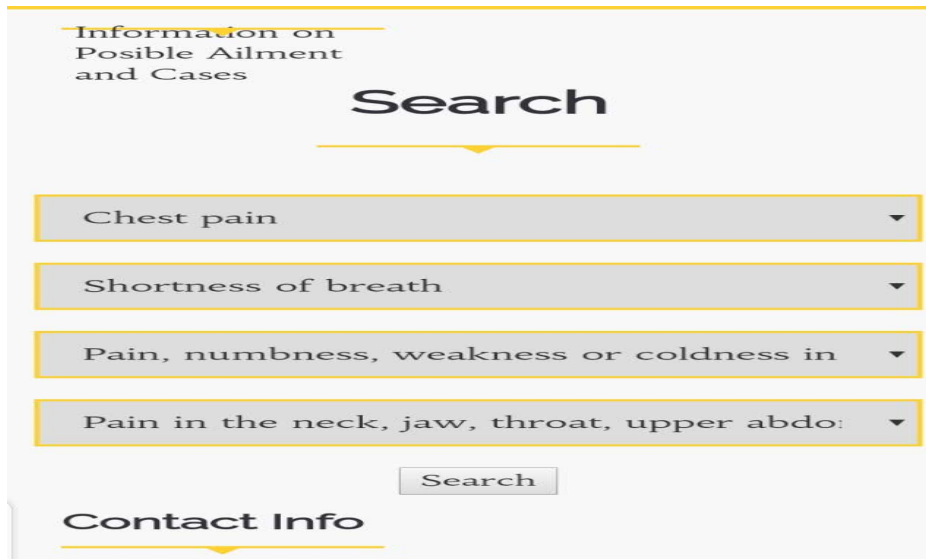module provides the user with interface to select desired symptoms for proper diagnosis.

Fig7: Symptom Selection Page

Diagnosis Result Module

The Heart Disease Perdition System using Expert System and Data Mining presents results showing the probability of chances of occurrence based on the knowledge and information entered. After the symptom has been selected, next step is diagnosing and the system has accurately diagnosed the patients for ailment such as Coronary Artery. Figure 8 below is final result obtained from the system after testing the system with various symptoms.
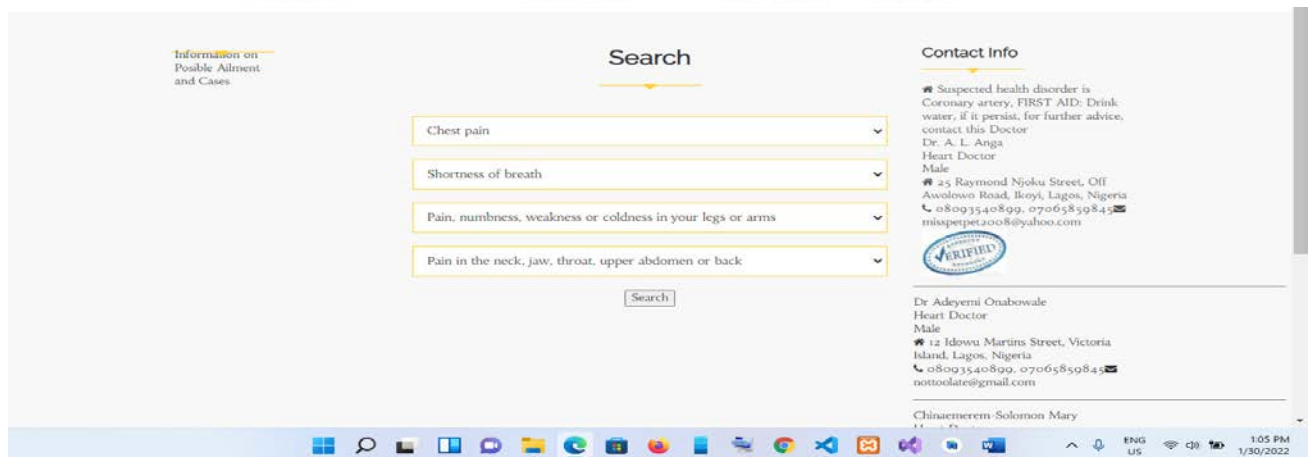

Fig 8: Diagnoses Result Module

CONCLUSIONS

This research is web based application for Heart Disease Prediction System. The system is user friendly, economical and efficient, which allows a patient or user to interact with a computer and mobile application. As a web based application, the designed system is limited and can only be utilized in environment with Internet access. In this system, the

username and password are sent by the web application to the server, where they are then processed to authenticate the application's credentials by verifying the username and password that have been registered with the server. If the destination exists, the information is then processed and delivered there. The user is supposed to choose from a list of heart disease symptoms when the system is consulted, including wheezing, chest discomfort, shortness of breath, diabetes, weariness, and obesity. It performs a diagnosis by consulting its knowledge base, which has certain pre-programmed indications and symptoms linked to particular specific illnesses, helpful resources, the name of the illness, and a medication prescription for it. The system has been able to accurately diagnose common heart disease ailment such as Coronary Artery and can be upgraded to diagnose other disease not presently catered for.

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