******The British College**

**KATHMANDU**

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Award name: BSc (Hons) Computing

Module code:

Module name: Production Project

Module run:

Coursework title:

Due Date:

Module leader: (In LBU)

Module Supervisor: (In TBC)

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**Smart Health Diseases Prediction System Using Machine Learning.**

**Module: Production project**

**Date:**

**BSc. (Hons) in Computing**

**[level 6: 2ND Semester]**

**Submitted To:**

**Submitted By:**

**Contents**

1. **Abstract**

**Introduction**

The project aimed to build a website which helps patient to guess his/her diseases based on symptoms and suggest him/her the right doctor. It focuses mainly to allow the user to get instant guidance on their health problem through the Website, to allow the user to search for doctor’s help, and to do research on existing Smart health diseases prediction system. Machine learning is a branch of artificial intelligence (AI) that allows computers to learn and develop on their own without having to be explicitly programmed. Machine learning is concerned with the creation of computer programs that can access data and learn on their own. Machine learning can be used in various fields like the health sector, Telecommunication industry, criminal investigation, Fraud Detection, Financial Banking, etc. It may have occurred to you or someone close to you in the past that you required emergency medical assistance but were unable to locate one.

There were lots of machine learning algorithms techniques that convert data into meaningful information. Machine learning has simplified the process of effectively diagnosing and identifying various illnesses. The medical field has a wide amount of data that can be processed with the help of machine learning techniques. Due to the wide amount of data to predict accurately we need a naïve Bayes algorithm because the Naive Bayes model proved suitable for the construction and analysis of very large datasets. This model was a basic yet complex classification approach that worked well in even the most difficult circumstances. Django framework of python is used to build website and model was deploy on Django framework for prediction of diseases. The libraries such as panda, NumPy, naive Bayes, multinomial, sklearn and other required framework was described on the theoretical framework.

This paper's methodology for smart health disease prediction systems is based on the Agile methodology. Supervised and unsupervised learning models are two types of machine learning models. For this project, we used a supervised learning model. Supervised learning uses a training set to teach models to yield the desired output. This training dataset includes inputs and correct outputs, which allow the model to learn over time. The algorithm measures its accuracy through the loss function, adjusting until the error has been sufficiently minimized. In our project, we used data Kaggle datasets. The data analysis includes a process of inspecting, cleansing, transforming, and modeling data to discover useful information, informing conclusions, and supporting decision-making. The details for data analysis are included under the research method heading under the data analysis.

This project looks into the development of a model that can predict diseases based on user symptoms which is beneficial in providing patients with quick and appropriate medical care. Smart Health Diseases Prediction System was used to predict diseases using patient treatment history Symptoms and health data. This health prediction system allows users to share their symptoms. It then processes the user’s symptoms to check for various illnesses that could be associated with it and if the system was not able to provide suitable results, then it shows that diseases were not found for patients.

The report starts with a brief introduction to machine learning in the field of the health sector. It then describes the existing system which was included in a literature review. Similarly, it describes the technology used in the project on the technology review. Then the chosen methodology, design, and implementation are included in the development methodology, design, and implementation part of the project. After that in testing to ensure that all the functionality of the system works correctly or not which includes on testing part of the report. After that, the whole project is critically evaluated which includes the evaluation of the project. Then at last report finally concludes with a summary at the conclusion part of the project.

**Literature Review**

**Background**

Using data mining and machine learning approaches to predict disease based on patient treatment history and health data has been done from the past decades. Many studies have used data mining approaches to predict diseases using pathology data or medical profiles. These methods attempted to predict illness recurrence. In addition, several techniques attempt to predict illness management and progression. Deep learning's recent success in machine learning has prompted a move toward machine learning models that can learn complex, hierarchical representations of raw data with minimum pre-processing and provide more accurate results. Disease prediction has received more attention from the perspective of big data analysis because of the advancement of big data technology; various studies have been conducted by automatically selecting characteristics from a large number of data to improve the accuracy of risk classification rather than the previously selected characteristics to improve the accuracy of risk classification. The main focus is to apply machine learning in healthcare to expand patient care and improve outcomes. Machine learning has simplified the process of accurately diagnosing and identifying various illnesses. Predictive analysis using efficient machine learning algorithms helps in more accurate illness prediction and treatment of patients. The healthcare sector generates huge volumes of data regularly that may be utilized to extract information for predicting sickness in the future based on a patient's treatment history and health data. This Data from the healthcare industry will be mined for secret information that will be used later. For making impactful decisions about a patient's health. In addition, by utilizing useful data in healthcare, these areas may be improved (Akash C. Jamgade, May 2019).

**Advantages and Proposed system**

The Health Prediction System was a project that provides online consulting and end-user assistance. There were lots of advantages of health prediction systems some of them are permits people to obtain immediate help with their health problems via an online intelligent health care system. Users can report their symptoms and concerns using this health prediction system. It will help users in receiving quick medical care and diagnosis. This method helps in reducing the patient's waiting time (Anon., n.d.).

The system consists of a login registration system where if the patient was a first-time user, he will fill out his personal information and create a user ID and password to access the system. If the patient already has an account, he or she can log in to the system. Patients can see their submitted information and can only see the doctor's limited information. The patient will describe the symptoms produced by his sickness, and the system will predict the disease based on the symptoms, as well as recommend doctors based on the disease.

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**Similar System Review**

Based on predictive modeling, the "Smart Health Prediction Using Machine Learning" system predicts the disease of patients/users based on the symptoms that the user provides as an input to the system. User/patient login, doctor login, and admin login are the three methods for logging into the program. The system analyzes the symptoms provided by the user/patient as input and outputs the chance of disease based on the algorithm's prediction. The installation of the Naive Bayes Classifier allows for smart health prediction. The Naive Bayes Classifier calculates the percentage likelihood of disease by considering all the characteristics that were learned during the training phase. The exact interpretation of illness data aids early disease prediction in patients/users and offers a clear picture of the condition to the user. Following a prediction, the user/patient can utilize a chat consulting window to consult a specialized doctor. It extracts new patterns from previous data using machine learning algorithms and database management approaches. With the use of a machine learning algorithm, the prediction accuracy may be improved, and the user/patient will have quick and easy access to the system (Kumar, 2021).

The main aim of this study is to examine the application of data mining in medical health care. These data mining techniques may also be applied to research and education in a variety of ways. The Smart Health Prediction System in the field of medicine's fastest-growing sector. Data mining is a branch of computer science that makes use of current data in the medical profession to predict illness incidence. extract new patterns can be done from huge datasets and gain information by using machine learning and database management technologies. The following article surveys show how data mining techniques and machine learning are used to predict illnesses based on user symptoms (Gopu, 2021).

The Smart Health Prediction system, an expert system that is utilized to overcome the shortcomings of existing systems and make doctors' jobs easier. The system examines a patient at a basic level and proposes illnesses that may be present. It begins by inquiring about the patient's symptoms; if the system can identify the right condition, it then recommends a doctor. If the system is unsure, it will ask the patient some questions. If the system is still unsure, it will show the patient some tests. The system will present the outcome based on the available cumulative data. Based on a database of multiple patients' medical records, the Smart Health Prediction system uses deep learning (one of the machine learning methods) and database management to determine the most accurate sickness that might relate to a patient's symptoms. Deep learning is used to map symptoms to potential illnesses with improved precision and speed. This approach not only makes doctors' jobs easier, but it also helps patients by getting them the care they need as soon as possible. (Hariraman.S, 2018).

The paper gives an overview of data mining techniques and their uses, as well as the medical and educational elements of Clinical Predictions. A huge quantity of data is becoming available in the medical and healthcare fields because of the availability of computers. Humans cannot analyze such a vast volume of data in a short period to establish diagnoses and treatment plans. One of the main goals is to assess data mining techniques in clinical and healthcare applications so those correct judgments can be made. It also includes an explanation of medical data mining approaches that can help with Clinical Predictions in a variety of ways. It is a new, powerful technology that is generating a lot of buzz in the computing industry. It is a branch of computer science that takes data from many databases and transforms it into fresh research and findings. It helps to used machine learning and database management to extract new patterns and the information associated with these patterns from big data sets. The job at hand is to extract data using automated or semi-automated methods. Clustering, forecasting, route analysis, and predictive analysis are some of the factors used in data mining (Harmalkar, 2017).

This project may be utilized for data mining techniques in medical, scientific, and educational fields, among other things. A huge quantity of data is becoming available in the medical and healthcare fields because of the availability of computers. As a result of technology's advancements in the computer industry, there is no longer a need to deal with such a big volume of data at the same time. This paper's main goal is to assess data mining techniques in clinical and healthcare applications to make appropriate judgments. It is a well-known and strong technology that piques people's curiosity in the computer world. It is a branch of computer science that converts current data from a variety of databases into new research and results. It extracts unique patterns and the information associated with these patterns from huge data sets using Artificial Intelligence, machine learning, and database management techniques. Clustering, forecasting, route analysis, and predictive analysis are some of the factors used in datamining (Tripathi, 2018).

A framework that allows customers to obtain real-time guidance on their medical issues via an online intelligent health care system. Different symptoms and the sickness or illness connected with those systems by the framework. Users may also discuss their symptoms and problems with the system. Users may also discuss their symptoms and problems with the system. Data mining as an area of study has previously demonstrated its ability to find hidden patterns, analyze data, and apply knowledge to a variety of research fields. It is currently gaining appeal among academics and scientists for producing innovative and profound insights from huge biological datasets. The finding of novel biological and healthcare-related knowledge to help clinical decision-making is another element of data mining. According to large literatu­­re analysis, early disease prediction is the most sought topic of study in the health care industry (Zodage, 2018).

It may have occurred to you or a close to you on several occasions that you or they require emergency medical assistance, but they are unavailable due to a variety of factors. The Health Prediction System is a project that provides online consulting and end-user assistance and presents a technique that allows users to get real-time health recommendations from an online intelligent health care system. Various symptoms and the disease/illness linked with those systems are input into the system. Users can discuss their symptoms and problems with the system. It then examines the user's symptoms to see if any illnesses might be linked to it. Here, some sophisticated data mining algorithms to determine the most likely condition to be linked to the patient's symptoms. If the system was unable to provide enough results, it informs the user of the disease or sickness to which the user's symptoms are thought to be linked. If a user's symptoms do not match any of the conditions in our database, it presents a list of diseases that the user may have based on his or her symptoms (Anon., 2021).

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# **Review of Technologies**

The choice of the right technology was one of the key points for the success of any product. Depending on the context, the term technology can have a variety of meanings. It usually relates to equipment, systems, and procedures. Specifically, those that are the product of scientific information that is now being used in real-world situations (Anon., 2021). In today's world, we can find lots of technology and tools to complete the product. The technology should be able to fulfill the requirements which were stated before. To complete any project there was requirement of both hardware and software which was described below:

**Development Tools/IDE**

**PyCharm**

PyCharm is the most widely used IDE for Python coding. We can work with many databases directly in the IDE without having to combine them with other programs. Although it was built only for Python, this IDE can also produce HTML, CSS, and JavaScript files. It also has a good user interface that can be modified via plugins to suit your needs. The user interface of PyCharm was shown on the screenshot given below.

Text

Description automatically generated

PyCharm provides its customers and developers with some of the greatest features. PyCharm makes it easier to complete code, whether it is for a built-in or external package. For a developer working in Python, queries were in commonplace. PyCharm features blue sections that can describe the difference between the last commit and the current one, so you can quickly verify the last commit. All the installed packages were shown properly visually, and this contains a list of existing packages as well as the option to search for new ones (Anon., 2021).

**Visual code**

Visual Studio was a Microsoft-developed Integrated Development Environment (IDE) for creating Graphical User Interface, web applications, console, cloud, and web services etc. It makes use of Microsoft's several software development platforms, such as Windows Store, Microsoft Silverlight, and Windows API, and others. This was not a language-specific IDE; users can use it to develop in C#, C++, VB, Python, JavaScript, and a variety of other languages. It was compatible with 36 different programming languages. It is suitable for both Windows and Mac OS X (Anon., 2021).

**Languages, Frameworks and Libraries**

**Python**

Python is an interpreted, object-oriented, high-level programming language. Its high-level built-in data structures, along with dynamic typing and dynamic binding, making it ideal for Rapid Application Development and as a scripting or bridge language for connecting existing components. Python's concise, easy-to-learn syntax promotes readability, which lowers software maintenance costs. Modules and packages were supported by Python, which facilitates program modularity and reusability. The Python interpreter and its vast standard library are free to download and distribute in source or binary form for all major platforms. Some of the advantages of python was it is simple to read, learn, and write. Python is a high-level programming language with a syntax that is like English, and Python is a very productive language (Anon., 2021).

**Django**

Django is a high-level Python Web framework that promotes quick development and simple, practical design. It was built by professional developers to take care of a lot of the problems of Web development so you can concentrate on building your app instead of reinventing the wheel. Advantages of Django framework was Django is concerned about security and assists developers in avoiding numerous typical security blunders. Django was created to make it as easy as possible for developers to get from concept to completion (Anon., 2021).

### 

### **HTML, CSS, JS, and Bootstrap**

HTML (Hypertext Markup Language) is the foundation of a website and is the first item to load in a web browser and it is a coding method for presenting information received from the Internet. A Web page (from the World Wide Web) is a retrieval unit that typically contains hypertext connections that allow similar pages to be accessed. CSS, or Cascading Style Sheets, was a basic design language designed to make the process of creating web pages presentable easier. The appearance and feel of a web page are handled by CSS. CSS allows you to manage the color of the text, font style, paragraph spacing, how columns are scaled and laid out, what background images or colors are used, layout designs, display variants for different devices and screen sizes, and several other effects. JavaScript is a text-based programming language that allows a developer to build interactive web pages on both the client and server sides. Whereas HTML and CSS provide structure and design to web pages, JavaScript adds interactive features that keep users engaged (Anon., 2019).

**Panda**

Pandas is a Python library that provides high-performance, simple data structures and data analysis tools for the Python programming language. It is open-source and BSD-licensed. Python with Pandas was utilized in a variety of academic and commercial sectors, including finance, economics, statistics, analytics, and more (Anon., 2021).

**NumPy**

NumPy is the most important Python module for scientific computing. It's a Python library that includes a multidimensional array object, derived objects (such as masked arrays and matrices), and a variety of routines for performing fast array operations, such as selecting, I/O , logical, mathematical, shape manipulation, sorting, discrete Fourier transforms, basic statistical operations, random simulation, basic linear algebra, and much more (Anon., 2021).

**Multinomial NB**

The multinomial Naive Bayes classifier is good for discrete feature classification (e.g., word counts for text classification). Normally, integer feature counts are required for the multinomial distribution. Fractional counts, such as tf-idf, may also function in practice (Raghavan, 2021).

**Scikit-learn**

Scikit-learn is without a doubt the most significant Python machine learning package. The sklearn package includes several useful machines and statistical modeling algorithms, including as classification, regression, clustering, and dimensionality reduction.

**Xampp server**

XAMPP is an acronym that stands for Cross-Platform, Apache, MySQL, PHP, and Perl, with the Ps standing for PHP and Perl, respectively. XAMPP is a popular cross-platform web server that allows programmers to write and test their code on a local webserver. It was created by Apache Friends, and the audience can update or modify its native source code. It includes Apache HTTP Server, MariaDB, and interpreters for PHP and Perl, among other computer languages. It is available in 11 languages and runs on a variety of platforms, including Windows' IA-32 package, Mac OS X's x64 package, and Linux's x64 package (Anon., 2021).

**Graphical user interface, text

Description automatically generated**

This is the web-based system, which is Nepal's first online healthcare service provider, allowing users to visit qualified medical experts and get more health-related services, as well as health-related information. One may obtain thorough, customized, research-based, and certified information, as well as professional doctor's advice. This service is frequently used to better understand a medical problem, diagnosis, treatment options or alternatives, and future therapeutic conditions suggestions. This system assists individuals in better understanding their health, making better health-related decisions, and locating the top physicians and treatments. This application is written on php.

The overall website looks good, and its features are awesome. The only problem on the website was there was not prediction system on the website user have to consult with the doctor to find the diseases based on their symptoms. In the context of Nepal, there are lots of websites where we can consult and can-do online booking, but it is difficult to find a prediction system that can predict diseases and suggest a doctor. So, if there is a prediction system on the website user experience much better.

There are lots of alternative tools and technologies to develop the product, but we need to choose those tools and technologies which help to meet our target. There were lots of programming languages for backend purposes like Php, java, c, react, etc. for this project I used python because Python is one of the most accessible programming languages available since it has a simple syntax and is not overly complex, allowing natural language to take center stage. Python scripts may be created and performed considerably faster than other programming languages due to their ease of understanding and use. There are lots of frameworks for website development, but I have chosen the Django framework because Django was a framework of python, which is easy to learn, and on Django, we can deploy machine learning model easily than other frameworks like Laravel. To design the website and model we need IDE. There are lots of IDE which we can use on a project like Visual Studio Code, PyCharm, sublime text, Eclipse, etc. for this project I choose two IDE one is PyCharm, and another is visual code. Both PyCharm and visual code are better than other ide for designing a website and deploy a model. We used the Django framework, so PyCharm is better for Django because Django was a framework of python and PyCharm was specially design for python. Similarly, there are lots of localhost server e.g., cPanel, SQLite, xampp, etc. for this project I choose xampp server because it is a MySQL localhost server which is easy to run in window and the XAMPP stack of software is an open-source localhost server that includes a bundle of software that provides a variety of features. The establishment of a MySQL database is one of the most essential features given by XAMPP. For the prediction of a model there are lots of model like decision tree, logistic regression, Linear Regression, naive Bayes, etc. in the case of health prediction system naïve Bayes model is suitable because, in comparison to more complex approaches, naive Bayes classifiers can quickly learn to exploit high dimensional features with little training data due to the class independence assumption. This is especially beneficial when the dataset is tiny in comparison to the number of characteristics, such as photos or words.

**Methodology and Design**

## Rapid application delivery, cost reduction, and the avoidance of important risks are all benefits of choosing the right software development methodology. It also gives the developer best practices for creating software apps that match real-world client demands. Generally, the development of any system consists of five-phase initiation phases where the requirement was gathered, design, development, testing, deployment, and last review. Controlling and managing the software development process is crucial in ensuring that the final software program has a high level of integrity, quality, and client satisfaction. Agile was the most effective among the many software process models such as Waterfall, Critical Path Method, Prince2, and so on.

## Considered Methodologies

**Agile Methodology**

Agile methodology is a type of project management approach that is mostly used in software development, and in which needs, and solutions emerge from the collaborative efforts of self-organizing and cross-functional teams as well as their clients. This methodology was chosen for the web development project because the phases of web development are generally done at the same time in an agile manner. Websites have shorter development life cycles, and therefore require regular changes to keep up with changing demands. It matches these criteria well since it is more adaptable, whereas older methods are expensive and have limited flexibility. Because the agile approach is more adaptable, it aids in the development of websites that are seamless, fast, minimal in size, and simple to use. Agile development improves the quality of a website by making it more stable with fewer mistakes.

Diagram

Description automatically generated

Various identified development stages were then carried out to completed tasks are described below:

**Requirement analysis and planning**:

Initially, the project requirements were defined using the module manual during this stage. After that, potential projects were investigated, a suitable project was chosen, and the scope and features of the project's ultimate result were decided. The project specification document was then written and submitted for approval. Following permission, further study and a Literature and Technological Review were completed. The work breakdown structure was created and the approach to follow throughout the project's lifespan was determined.

**Design:**

Following the requirement analysis and planning phase, In the Design stages, conceptual models for the end product, such as context diagrams, data flow diagrams, Erd, and flow charts, were created to improve the level of the real product.

**Development and Implementation:**

The product was developed once the conceptual models were completed. After that, the website's frontend and backend development were completed, and the model was prepared and deployed on the website. The product's implementation is detailed in a subsequent section of this report. In addition, the documentation was developed concurrently with the product development.

**Test and Maintenance**

The produced product was thoroughly tested to guarantee that it performed as intended. Any problems discovered at this stage were fixed. Detail of testing is described in the testing part of this report.

**Deploy and review:**

Initially, the produced product was demonstrated and discussed with the customer or with the supervisor at this stage, and necessary modifications were made to the product based on their comments. After the product was finished, it was reviewed to see if it met its initial goals and provided the expected advantages. The product will be deployed on the server at this point. Future work/recommendations were highlighted when the limitations were recognized. In addition, the product was presented, final documentation was prepared, and the project was then submitted.

Developing any project methodology, play an important role. In this project agile methodology was used but there are lots of alternative methodology like Scrum, Six Sigma, waterfall, etc. For the development of software or website waterfall and agile were mostly used methodology. In this project, we used agile instead of the waterfall because the product is mostly tested at the conclusion of the project with Waterfall. Testing may arrive too late in the cycle to make significant changes if the product demands were not properly captured at the start of the project. It is impossible to go back and modify a step in Waterfall once it has been finished. Agile, on the other hand, creates a functioning version of the entire project (an MVP) so that the developer may change the way it is created. Initial needs have a big role in a waterfall. However, things become very tough if these criteria are not written clearly, or if there was a misunderstanding about the details of what the customer needed. Agile, on the other hand, ensures that requirements are validated and confirmed at every stage of the project.

# **Software Requirements Specifications**

The Smart Health Prediction System's functional and non-functional needs were documented in a software requirements specification document. The Smart Health prediction system's system features (functional requirements) are shown in the table below, along with their priority.

|  |  |
| --- | --- |
| **Feature** | **Priority** |
|  |  |
|  |  |
|  |  |
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|  |  |

# **Product Design**

Before moving towards the development of the product, Initially, the designs were created to create a clear path/guideline for developing and visualizing the final product.

**Use Case Diagram:**

In UML diagrams, use case diagrams are a technique to encapsulate the system's functionality and needs. It records a live system's dynamic activity. A use case diagram is made up of two parts: a use case and an actor. A use case denotes a specific feature of a system, component, package, or class. In this report a use case diagram is created to help new users to learn the flow of smart health prediction system. In the given below screenshot of overview usecase, admin usecase and user usecase was shown:

Diagram

Description automatically generated

Diagram

Description automatically generated

Diagram

Description automatically generated

**ERD (Entity relationship Diagram)**

The Entity Relationship Diagram, often known as the ERD, ER Diagram, or ER model, is a form of database architecture structure diagram. The primary entities within the system scope, as well as the inter-relationships among these entities, are visualized using different symbols and connectors in an ERD. In the below screenshot ERD diagram of this product is shown where the relationship between user symptom, diseases user, and doctor are shown:

Diagram

Description automatically generated

**Data Flow diagram**

A data flow diagram (DFD) shows how information flows through a system or process. It shows data inputs, outputs, storage places, and paths between each destination using specified symbols as well as brief text labels. In product designing Data flow diagram plays an important role because it is a fantastic communication tool between the user and the system designer because of the visual representation. In the given below data flow diagram, the user can login into the system. After login user sent queries to the system and the system responds to those queries. Admin can view, update, and delete the data of users. In the below screenshot data flow diagram

between user admin and system was shown:

Diagram, engineering drawing

Description automatically generated

**Context diagram**

In a Data Flow Diagram, the Context diagram is the topmost level diagram. It is a tool that is used to analyze the features and limitations of a project's system to be built. It highlights the information flow between the system and external components. In the given below context diagram user can view information of doctor, request for suspected diseases and suggested doctor and view and update their profile. After that system displays the output according to the user request. In the admin dashboard, the admin can add, update, and delete user and doctor details. In the given below screenshot context diagram of the smart health prediction system was shown:

Diagram

Description automatically generated

**Flow chart**

A flowchart displays the different stages of a process in a logical sequence. It is a general tool that may be customized for a wide range of applications and can be used to represent several processes, including manufacturing, administrative and service processes, and project plans. In the given below flow chart, if the user is not registered, they have to do registration and if the user has an account, they can login into the system. After login into the system user give some input to the system and according to the user input system predict the result and displays the result to the user. In the below screenshot flow chart of a user was shown:

Diagram

Description automatically generated

**Wireframe**

A website wireframe sometimes called a page schematic or screen blueprint is a visual representation of a website's skeleton architecture. The wireframe illustrates the website's content page layout, including interface components and navigational mechanisms, as well as how they interact. Before beginning the development of any framework, a wireframe is required. The wireframes that follow were created at the start of the project and can be updated as needed during the refinement phase.

Text, letter

Description automatically generated

Above screenshot is the homepage wireframe of the system. This is the initial view when user visit to the site.

A picture containing diagram

Description automatically generated

Above wireframe is login page of the system. In this login page login form is included from where user can login into the system.

Diagram

Description automatically generated

Above wireframe is Signup page of the system. In the Signup page Registration form is included from where user can create account in the system.

Table

Description automatically generated

Above wireframe is doctor information page of the system. In this page user can view detail information of the doctor included on the table.

Diagram

Description automatically generated

Above wireframe is the screenshot of prediction page. In this page form is included from where user input symptom and get suspected diseases and suggested doctor according to their diseases.

Graphical user interface, application

Description automatically generated

Above wireframe is the screenshot of about us page. In this page user can view the detail about the system.

**Diagram

Description automatically generated with low confidence**

Above wireframe is the screenshot of user profile page. In this page user can view their detail and medical history.

**Implementation and Testing**

**Product Implementation**

A smart health prediction system was the product requirement for this project. To complete this product successfully required implementation of the framework, library, design, ide etc. which were mentioned in the above part of the report. The required implementation evidence while making product are given below along with the screenshots:

**Install Xampp server**

To host a website database server is required in this product xampp server is used as a database server to host the website. XAMPP Version: 7.3.28 was installed on window 10. The screenshot of the installation of the xampp server is shown in below diagram:

Graphical user interface, application

Description automatically generated

**Install Python**

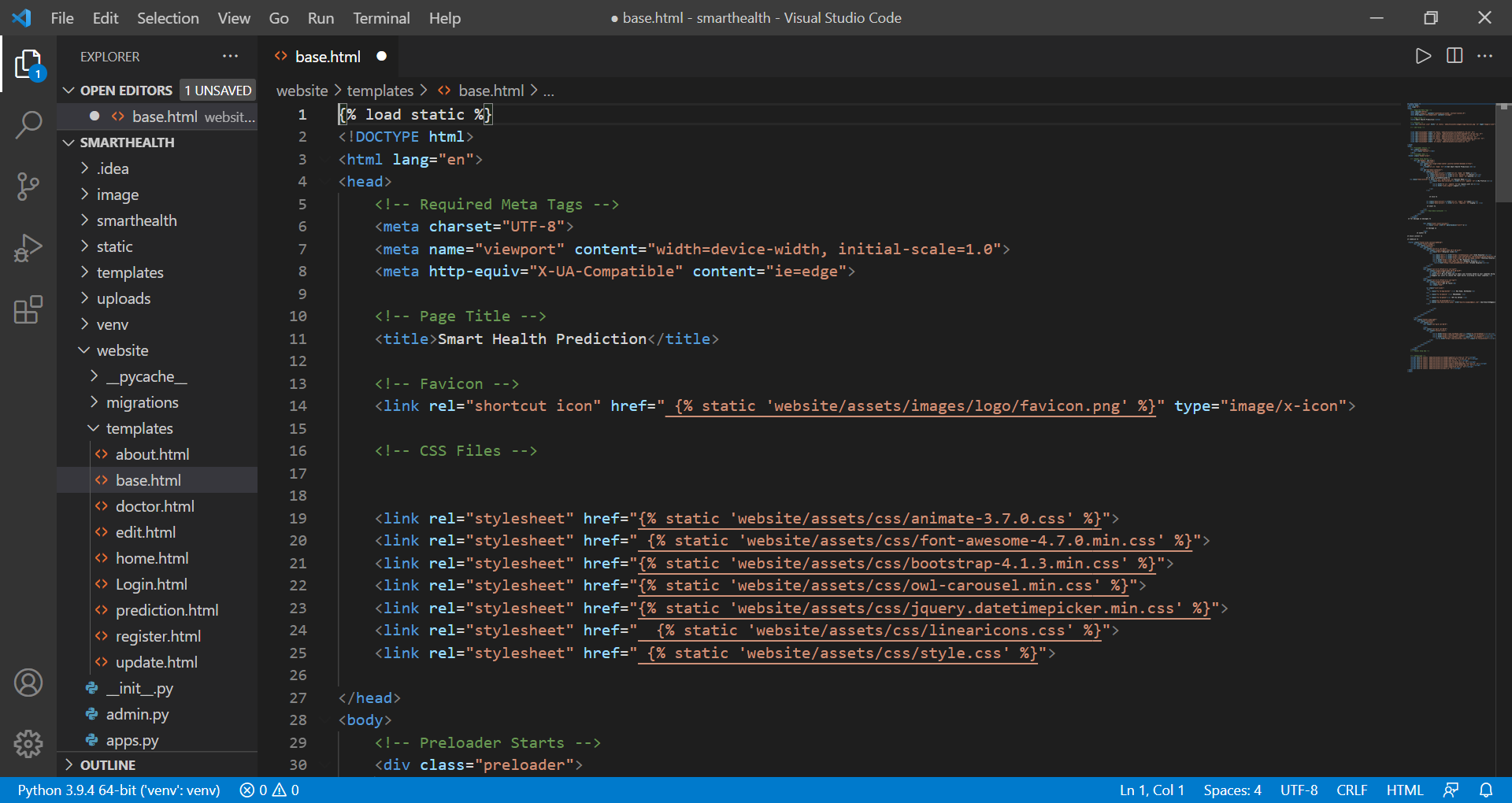
To run a python project on a desktop python should be installed on the desktop. Python is available for the window in a different version. Python version 3.9.4 was installed on the system which is shown on the below screenshot:

Graphical user interface, text, application

Description automatically generated

**Frontend design**

For any system at first, we need a user interface. User Interface can be done through GUI (Graphical user interface) or through a web-based system. For this product user interface was represent through the website. In any website at the first stage, the frontend was done. In this product, the frontend was done by using Html, CSS, and JavaScript. In the below screenshot home page of the product was shown with some frontends and refer to Appendix for full code:



**DATA**

On the website there was the requirement of the database server to store data in the Django framework database can be store on a different server by using database table. In this project Xampp server is used to create the table in a database there was a certain code in Django which was shown on the below screenshot to create database table.

Graphical user interface, text

Description automatically generated

**Backend**

To developed smart health prediction system backend should be done for a different purpose. Django framework was used for backend purposes which is the framework of python. In this product login, registration, prediction, to add doctor information, to edit user detail, etc. was done by using python code. In the given below screenshot some code of python was shown which was implemented for backend purpose and refer to Appendix for full code:

Text

Description automatically generated

**Model for Prediction**

Main objective of this product is to predict the user diseases by symptom provided by the user. For this prediction system naïve bayes model was used by importing different library of python like NumPy, panda, multinomial etc. and model was deployed on view.py file. In the given below screenshot some code of python was shown which was implemented to designed Model and refer to Appendix for full code:

Text

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**Product Testing**

Testing is necessary to evaluate the functionality of a system. Testing is important in any product development because Software testing is essential for identifying faults and mistakes that occurred throughout the development process. E.g., During the implementation of the software, programmers may make a mistake. There might be a variety of causes for this, including the programmer's lack of experience, lack of understanding of the programming language, insufficient domain experience, improper algorithm implementation owing to complicated logic, or simple human mistakes.

Black Box testing was used to conduct product testing. The output was evaluated once the input was given. Black box testing is a simple approach since it does not require any programming knowledge, and even the tester can perform it well.

|  |  |  |
| --- | --- | --- |
| **Activity Number** | **Description** | **Results** |
| 1. | Display Doctors information on user interface. | pass |
| 2. | User Registration. | pass |
| 3. | User login into the website with username and password. | pass |
| 4. | Admin login into the dashboard with username and password. | pass |
| 5. | User registration form that collects username, email, DOB and so on. | pass |
| 6. | Guess the Diseases based on patient symptoms for login user. | pass |
| 7. | Suggest the doctor according to the patient’s diseases for login user. | pass |
| 8. | Only login user will have a facility to get instant guidance on their health problem. | pass |
| 9. | Admin can edit user and doctor detail. | pass |
| 10. | User can view profile with medical history. | pass |
| 11. | Admin can add user and doctor into the system. | pass |

**Product Evaluation**

Product evaluation is the process of evaluating the quality and safety of a manufactured product for users. The product evaluation is done to determine whether the product met its goals and objectives or not. In the given below table initially expected product features as per project specification is compared with obtained output:

|  |  |  |  |
| --- | --- | --- | --- |
| **Feature** | **Expected** | **Outcome** | **Evaluation** |
| Registration | User registration form that collects username, dob, email and so on. | Registration form with dob,  Email, username, and so on | success |
| Prediction system | To allow user to get instant guidance on their health problem through Website. | User can view their diseases by entering their symptom on system and system suggested different department doctor according to their diseases. | success |
| Doctor information | To allow user to search for doctor’s help. | User can find doctor detail on doctor’s page with their contact number. | success |
| Login system | Admin and user login system. | Login system for both user and admin. Login into the system can be done by providing username and password. | success |
| Restriction for normal user | Only login user will have a facility to get instant guidance on their health problem. | Only login user can enter into patient mode where user can predict their diseases and view suggested doctor according to their diseases. | success |
| View/update  profile | Login user should be able to view their profile and edit their profile. | After login into the system user can view their profile and can edit profiles if they need. | success |
| Medical history | User should be able to view their medical history | Login user can view their medical history. | success |
| Admin panel | Admin should be able to view user detail with medical history.  Admin should be able to edit user detail.  Admin should be able to view doctor detail and able to edit& add user detail. | Admin can view user detail and medical history once they login into admin dashboard.  Admin can edit user detail through admin dashboard.  In admin dashboard admin can view doctor detail and able to add & update doctor detail. | success |

The features include in project specification was done successfully to make the system efficient and convenient. Since features mentioned in the initial specification were implemented efficiently, the final product was regarded to be a successful product.

**Project Evaluation**

A systematic and impartial examination of a current or finished project is known as project evaluation. The goal is to assess the project's relevance and level of success, as well as its development effectiveness, efficiency, impact, and long-term viability. It also provides an opportunity to consider how developers alter their working methods by examining how they operate and changing the items that need to be accomplished properly. On the other hand, if it cannot be estimated, it cannot be improved. Along these lines, all stages of the health prediction development lifecycle will be evaluated.

**Project Plan**

# Bibliography

Akash C. Jamgade, P. S. D. Z., May 2019. *International Research Journal of Engineering and Technology (IRJET),* s.l.: s.n.

Anon., 2019. *codewall.* [Online]   
Available at: https://www.codewall.co.uk/html-css-and-javascript-explained-for-beginners/  
[Accessed 6 2021].

Anon., 2021. *djangoproject.* [Online]   
Available at: https://www.djangoproject.com/  
[Accessed 6 2021].

Anon., 2021. *freelancer.* [Online]   
Available at: Smart Health Prediction Using Data Mining  
[Accessed 6 2021].

Anon., 2021. *https://www.python.org/.* [Online]   
Available at: https://www.python.org/doc/essays/blurb/  
[Accessed 6 2021].

Anon., 2021. *javatpoint.* [Online]   
Available at: https://www.javatpoint.com/xampp  
[Accessed 6 2021].

Anon., 2021. *marketbusinessnews.* [Online]   
Available at: https://marketbusinessnews.com/financial-glossary/technology-definition/  
[Accessed 6 2021].

Anon., 2021. *numpy.org.* [Online]   
Available at: https://numpy.org/doc/stable/user/whatisnumpy.html  
[Accessed 6 2021].

Anon., 2021. *tutorialspoint.* [Online]   
Available at: https://tutorialspoint.dev/language/c-sharp/introduction-to-visual-studio  
[Accessed 6 2021].

Anon., 2021. *tutorialspoint.* [Online]   
Available at: https://www.tutorialspoint.com/python\_pandas/index.htm  
[Accessed 6 2021].

Anon., 2021. *tutorialspoint..* [Online]   
Available at: https://www.tutorialspoint.com/pycharm/index.htm  
[Accessed 6 2021].

Anon., n.d. *chegg study.* [Online]   
Available at: https://www.chegg.com/homework-help/questions-and-answers/smart-health-disease-prediction-using-naive-bayes-might-happened-many-times-closed-ones-ne-q62623293  
[Accessed friday june 2021].

Gopu, D., 2021. prediction of Diseases in Smart Health Care System using Machine Learning. *International Journal of Recent Technology and Engineering,* Volume 8.

Hariraman.S, A., 2018. *DEEP LEARNING IN SMART HEALTH PREDICTION SYSTEM,* s.l.: s.n.

Harmalkar, N. K. M., 2017. Smart Health Prediction System Using Data Mining. 2(2).

Kalyani Shahaji Zodage\*, P. S. T. S. R. S., 2018. Health Prediction System Using Data Mining. 15(2), pp. 696 - 699.

kumar, N., 2021. *Smart Health Prediction Using Machine Learning,* s.l.: s.n.

Raghavan, P., 2021. *kite.* [Online]   
Available at: https://www.kite.com/python/docs/sklearn.naive\_bayes.MultinomialNB  
[Accessed 6 2021].

Tripathi, K. K., 2018. A Smart Health Prediction Using Data Mining. 5(4).