

FOREST FIRE PREDICTION

A Project Report

Submitted in partial fulfilment of the
Requirements for the award of the Degree of

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

By

QURESHI AYESHA MOHD YUNUS

Seat Number: 2010843

Under the esteemed guidance of

Asst.Prof. Merina Gheevarghese



Laxmi Charitable Trust's

**SHETH L.U.J & SIR M.V COLLEGE OF ARTS,
SCIENCE AND COMMERCE**
(Affiliated to University of Mumbai)

**Dr. S.Radhakrishnan Marg, Andheri (E), Mumbai- 400 069
MAHARASHTRA**

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(Affiliated to University of Mumbai)
MUMBAI-MAHARASHTRA-400069

DEPARTMENT OF INFORMATION TECHNOLOGY



CERTIFICATE

This is to certify that the project entitled, "**FOREST FIRE PREDICTION**", is bonified work of **QURESHI AYESHA MOHD YUNUS** bearing Seat. No: 2010843 submitted in partial fulfilment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

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FOREST FIRE PREDICTION

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Asst.Prof. Merina Gheevarghese

2. Teaching experience of the Guide _____

3. Is this your first submission? Yes ☒ No

Signature of the Student

Signature of the Guide

Date:

Date:

Signature of the coordinator

Date:

ABSTRACT

Forest Fire Prediction website is a wildfire prediction website for people and organizations to speculate and take appropriate measures related to it using Machine Learning, Forest Fire can be predicted in a particular area, by taking majorly three parameters: Humidity, Temperature and Oxygen.

Forest Fire Prediction website has a very simple interface for quick and easy maintenance of the website. The management of accurate, up-to-date information regarding what is going on in relation to forest fires is critically important for all the citizens to know. The person doesn't need to worry about getting all input values if the user doesn't know any, there'll be a solution to that too.

This website predicts the wildfire which is about to happen in a particular area or region , and the amazing part apart from prediction is that you can book amazing Forest Safari from this website, check out the details of a lot other forests in India, it also has many pages like a page where preventive measures are given to take in these circumstances and also a page where up-to-date news is given with the availability to check the forest fire activities around the world and focus areas of the forest fire, and many more will be available through a website.

(Keywords: prediction, Forest Fire, Algorithm, Machine Learning, Firebase)

ACKNOWLEDGEMENT

I would like to express my gratitude to everyone who supported me throughout the project building process. I am pleased for the aspiring guidance, invaluable constructive criticism and friendly advice during the project work. I am sincerely thankful to all the teachers for sharing their truthful and illuminating views on a number of issues related to the project.

First and foremost, I am grateful to our project guide Asst.Prof. Merina Gheevarghese for her valuable guidance and constant support. She inspired me greatly to work hard on this project. Her willingness to motivate us contributed tremendously to our project.

Many thanks to all whose work, research and support helped me to move forward in my way to develop this website.

And finally, a big thanks to my family and friends for continuously being by my side supporting and leading us.

DECLARATION

I hereby declare that the project entitled, “**FOREST FIRE PREDICTION**” done at **Mumbai**, has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfilment of the requirements for the award of degree of **BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)** to be submitted as final semester project as part of our curriculum.

Qureshi Ayesha Mohd Yunus

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CHAPTER 1

INTRODUCTION

Forest fires are a matter of concern because they cause extensive damage to the environment, property and human life. Hence, it is crucial to detect the forest fire at an earlier stage. This can help in saving flora and fauna of the region along with the resources. Also, it may help to control the spread of fire at the initial phase. The task of monitoring the forests is difficult because of the vast territory and dense forest.

The forest fire has become a threat not only to the forest wealth but also flora and fauna and ecology of the environment of the region. The main cause of forest fires can be categorized under natural and man-made classes. High atmospheric temperature, lightening and dryness (low humidity) offer a positive environment for a fire to start which are the natural causes for forest fires.

1.1 BACKGROUND

In this website domain I propose a website that is inherited with a machine learning model for forest fire prediction. Till date, there hasn't been any model generated on this topic but a lot of research has been done on this topic. Recently in August 2021, A **total of 270 wildfires** started in 53 provinces across Turkey in the last 14 days also, Dozens of people died in Australia's 2019-2020 bushfire season, which was one of the worst on record. **More than 10 million hectares of land burned** and over a billion animals are estimated to have died, with many species pushed close to extinction.

This leads me to the topic of **WSN (Wireless Sensor Networks)** has gained a lot of importance and is widely used for forest fire detection, but by the time the sensors detect something like smoke or a burning sensation it's already late and we lose an entire forest with species close to extinction. So, the researchers are still working on some ideas using machine learning algorithms to predict wildfires in an area on the basis of the features of a particular environment. There are not many research papers on this particular topic but sufficient to gain knowledge about algorithms **Logistic Regressions, Support Vector Machine (SVM), Artificial Neural Networks (ANN)** and **Decision trees** that need constant work and practice to get tuning. The advent of high-power, low-cost computing has heralded the use of machine learning and neural networks for

predicting forest fires. Machine learning can see trends and patterns that humans often overlook.

1.2 OBJECTIVES

The objectives of the project is:

- To implement a forest fire prediction model using only three parameters for better understanding.
- To reduce the probability of false alarms of sensors.
- To predict a wildfire before it's caused, saving the life of thousands and lakhs of species.
- Efficient use of the environmental features like air temperature, humidity to predict a fire.
- To be able to book Online Safari easily and efficiently.

1.3.1 PURPOSE

Every year approximately 70,000 wildfires are caused either man-made or natural, causing damages and taking lives of lakhs of species both flora and fauna even in the presence of sensors, alarms and what not but still we cannot save them. So, to avoid damages to the ecosystem and safeguard the natural resources, I have proposed this system so as to protect the natural resources, human beings as well as the flora and fauna. This system will predict the wildfires before it's going to occur, giving us time to save the lives of species, and take prevention controls. Predicting the source and spread of forest fires could have considerable benefits for human health and life, the economy and the environment. This could help identify areas with higher risk - for example, with limited resources, the authorities could choose to focus on monitoring specific areas.

1.3.2 SCOPE

Nowadays, Forest fires have been the most trending topic in the years 2020 and 2021, we have lost 471,971 acres of forest to these fires. The main issue covered in this project is predicting a wildfire that is or is not going to happen at a given area, which will give us sufficient time to collect resources and visit the area and save the forest. I have developed a two-stage methodology which requires some input parameters like humidity, temperature and oxygen of an area and then the output will be whether there is a chance of the fire taking place or not. The prediction must be provided as fast as possible to be useful, thus it is necessary to

exploit all available computing resources and therefore my idea is to develop and work on an algorithm that'll have enough accuracy.

1.3.3 APPLICABILITY

This project can be used by any person and organization that senses something wrong in the air or just to keep a check where the fire is taking place. Predicting a wild fire or a forest fire will help to save lives of many people and animals and at the same time will give us time to use proper resources to calm the fire down quickly and easily. This website also is useful in many ways such as knowing the preventive measures when the forest fire will take place, also being updated to where the forest fire is taking place in India and many other places, attending or registering for events conducted by Forest Survey Of India and booking amazing online safari from this website is one of the best part here.

1.4 ACHIEVEMENTS

The website research and development till now has provided us with wide range of information regarding the resources which will be used in the development of the project like different types of machine learning algorithms, the choice and variety of databases that can be used with different languages.

1.5 ORGANISATION OF REPORTS

This report has been organized in a way to give a systematic outlook of the project.

Chapter 1: INTRODUCTION

Gives the need for the project, background and the description of Purpose, Scope and Applicability and conclude the project Achievements.

Chapter 2: SURVEY OF TECHNOLOGIES

Demonstrates the understanding of various available technologies and explain the suitability of chosen technology.

Chapter 3: REQUIREMENT AND ANALYSIS

Mentions Problem on which I am working, User Requirement, Software and Hardware Requirement, Conceptual Models.

Chapter 4: SYSTEM DESIGN

Explains design modules, Data Constraint, User Interface, Security and Test Cases.

Chapter 5: IMPLEMENTATION & TESTING

Explains how the implementation of the project is done in a detailed manner and the testing is performed.

Chapter 6: RESULTS AND DISCUSSION

Gives a detailed report of the test cases done on the project.

Chapter 7: CONCLUSION

Conclusion of the project with limitations and future scope of the project.

CHAPTER 2

SURVEY OF TECHNOLOGIES

Machine learning models play a major role in the process of evaluation and prediction. Prediction is often done by using the available variables within the data set. Through the available variables within the data set, machine learning models can make predictions for the long term. Machine learning is the top-shelf tool to conduct prediction analysis. Because of its learning feature, it can fine tune the parameters of its models just right to fit the data. This could take a lot of work if done by hand which would use advanced methods and a lot of hard work. Machine learning uses algorithms and compute resources to offer an abundance of computation that doesn't have to spend a lot of time doing the fine combing through a model's features. There are many algorithms in Machine Learning like Linear Regression, Naive Bayes, KNN, Forest and Decision Tree and in the Logistic Regression which I would be using to predict and make my model.

▽ HTML

Hypertext Markup Language (HTML) is a computer language that makes up most web pages and online applications. With HTML one can create and structure sections, paragraphs, and links using elements, tags, and attributes. It's like designing your own dream website with your creativity.

The purpose of using HTML in my website is:

- It is beginner friendly as well as easy to use and a person who doesn't know coding can have a look at it and understand it very easily.
- It is open-source and completely free, with a lot of resources & a large community behind it.
- It is easily integrated with different languages and runs natively in all web browsers.

▽ CSS

CSS stands for Cascading Style Sheets. In short, CSS is a design language that makes a website look more appealing than just plain or uninspiring pieces of text. Whereas HTML largely determines textual content, CSS determines visual structure, layout, and aesthetics.

The purpose of using CSS in my website is:

- It gives a better user experience, with all the buttons and text in the logical places and are well organized.
- With CSS, you can apply specific formatting rules and styles to multiple pages with one string of code.
- CSS combines with HTML to make responsive web pages.

▽ JAVASCRIPT

JavaScript has a unique position as the most widely-adopted browser language with full integration in HTML/CSS. While HTML & CSS structures and design the web page, JS makes it come alive.

▽ PYTHON

Python is a general-purpose interpreted, interactive, object-oriented, and high-level programming scripting language. It is one of the most used languages that are used and trending in 2021, which leads me to the topic,

The purpose of using Python in my website:

- It is easy to learn, beginner friendly and easy to remember and code.
- Python's bulk of the library is very portable and cross-platform compatible on all platforms.
- It provides interfaces to all major commercial databases.

▽ MACHINE LEARNING

Machine learning is vast, in terms of Classification, Regression, Clustering, etc. Machine Learning is widely and rapidly changing the world with Voice Assistants using Natural Language Processing (NLP) to make appointments, check our calendar, play music as per moods and even choosing movies, series over our past behaviour.

▽ LOGISTIC REGRESSION

Logistic regression is a statistical model that in its basic form uses a logistic function to model a binary dependent variable, although many more complex extensions exist.

In regression analysis, logistic regression (or logit regression) is estimating the parameters of a logistic model (a form of binary regression). Mathematically, a binary logistic model has a dependent variable with two possible values, such as

pass/fail which is represented by an indicator variable, where the two values are labelled "0" and "1".

In the logistic model, the log-odds (the logarithm of the odds) for the value labelled "1" is a linear combination of one or more independent variables ("predictors"); the independent variables can each be a binary variable or a continuous variable. The corresponding probability of the value labelled "1" can vary between 0 and 1, hence the labelling; the function that converts log-odds to probability is the logistic function, hence the name LOGISTIC REGRESSION.

▽ WHY IS PYTHON USED FOR IMPLEMENTING MACHINE LEARNING ALGORITHMS?

The reason why Python is so popular among data researchers, data scientists is that Python has a diverse variety of modules and libraries already implemented that makes our coding easier and with less effort.

1) NUMPY

It is a math library to work with n-dimensional arrays in Python. It enables us to do computations effectively and efficiently.

2) PANDAS

Pandas is mainly used for data analysis. Pandas allows importing data from various file formats such as comma-separated values, JSON, SQL, Microsoft Excel. Pandas allows various data manipulation operations such as merging, reshaping, selecting, as well as data cleaning, and data wrangling features.

3) SCIKIT LEARN

Scikit Learn is a robust machine learning library for Python. It features ML algorithms like Logistic Regression, random forests, k-means clustering, spectral clustering, mean shift, cross-validation and more.

4) PICKLE

In machine learning, while working with scikit learn library after making algorithms and training the model one has to save the model in order to use it again and again either for new data or adding in somewhere. Pickle is the standard way of serializing objects in Python. You can use the pickle operation to serialize your machine learning algorithms and save

the serialized format to a file. Later you can load this file to deserialize your model and use it to make new predictions.

▽ **FIREBASE DATABASE**

The Firebase Realtime Database is a NoSQL database from which we can store and sync the data between our users in real-time. A Real-time database is capable of providing all offline and online services. These capabilities include accessibility from the client device, scaling across multiple databases, and many more. Data validation and security are available through the Firebase Real-time Database Security Rules, expression-based rules executed when data is read or written.

▽ **HEROKU OR FLASK**

A basic app that is used to deploy machine learning model websites.

▽ **NODE.JS**

Node.js lets developers use JavaScript to write command line tools and for server-side scripting running scripts server-side to produce dynamic web page content before the page is sent to the user's web browser.

CHAPTER 3

REQUIREMENTS AND ANALYSIS

3.1 PROBLEM DEFINITION

Forest fires or Wildfires are a lot to take in at once and when it actually happens we often feel we could have taken enough measures and would have prevented it from happening. The main thing that we need to understand is that everything has its own course and flow, especially nature. What is bound to take place will definitely take place. Here, in this project I would like to discuss the difference between prevention and prediction of a wildfire, there are many projects which are based on the PREVENTION of the wildfire and doing a research on them I have found out that many researchers, analysts use a lot of new techniques like ANN, Decision trees, Motion Sensors, Fire Alarms, Smoke Detectors, etc these are just enough to detect a fire and we can take enough preventive measures then.

Predicting a wildfire adds value to our daily lives by assuring us that the environment in which we are living today is safe or not. By predicting wildfire or a forest fire that's about to take place in a particular area, I assume that we can actually save flora and fauna and human beings or people out of that area as soon as possible, even much before the fire will take place.

There is no current system like this as far as I have done the research, and I want to make this one successful so that actually we could predict a fire and save many lives and take necessary precautions that we need to take. The system tries to fit different probabilistic models to data from different locations. When the fitting is accomplished the system is used to estimate the probability of a forest fire taking place at a particular location. I tried out several inputs in the aim of finding the best parameters that can be used for prediction but out of many like 20 parameters I could pick up only which are related to weather, wind and speed. As a result, I picked up six useful parameters: OXYGEN, HUMIDITY & TEMPERATURE.

LIMITATIONS

The greatest challenge a fire model system faces in a predictive situation is the accurate estimation of representative input values.

A deterministic approach for fire behaviour prediction assumes best estimates of input conditions to represent the fire environment.

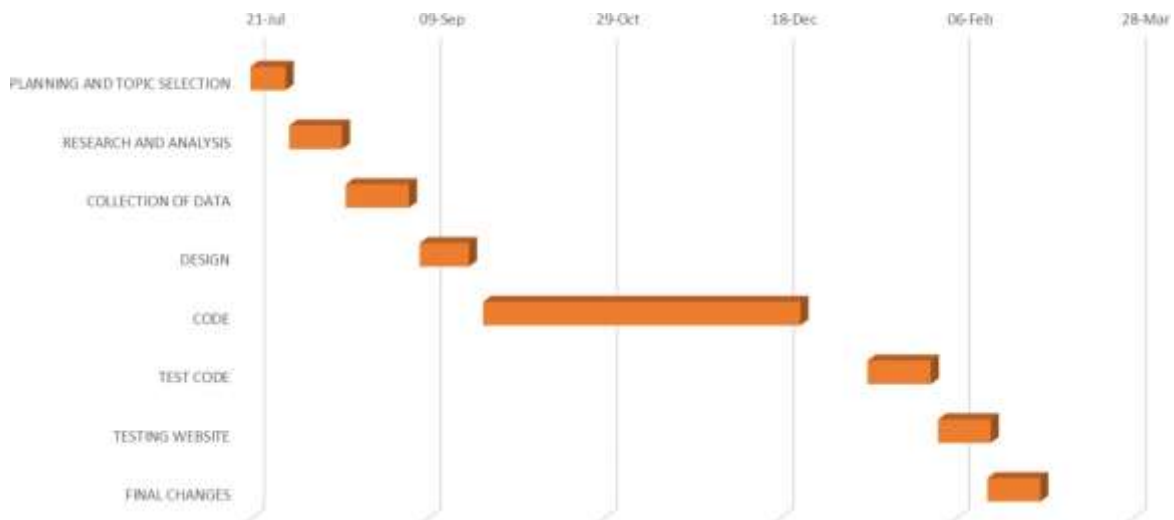
3.2 REQUIREMENTS SPECIFICATION

- Access to Internet
- Knowledge of the input parameters
 - OXYGEN
 - HUMIDITY
 - TEMPERATURE
- Personal details for subscription
- Personal details for Enquiry
- Details for login and registration when booking an online Safari.

3.3 PLANNING & SCHEDULING

SERIAL NO.	TASK	START DATE	END DATE	DURATION
1	Planning and Topic Selection	21-July	31-July	10
2	Research & Analysis	1-Aug	15-Aug	15
3	Collection of Data	17-Aug	5-Sept	18
4	Design	7-Sept	21-Sept	14
5	Code	25-Sept	25-Dec	90
6	Test Code	12-Jan	30-Jan	18
7	Testing Website	1-Feb	15-Feb	15
8	Final Changes	15-Feb	1-March	15

Gantt Chart for Project Schedule



Gantt Chart for Project Schedule



PERT Chart for Project Schedule

3.4 SOFTWARE & HARDWARE REQUIREMENTS

- **Hardware Requirements:** For development of System

Processor	Core i5
RAM	Minimum 4 GB
Space Required	256 GB HD Space minimum
System-Type	64-bit OS x 64-based processor

- **Software Requirements:** For development of System

Operating- System	Windows 10
Front-End	HTML, CSS, JS
Back-End	Python, Machine Learning, Firebase database
IDE	Visual Studio
Machine Learning Model	Jupyter Notebook
Library	Pandas, Numpy
Deployment	Heroku, Flask

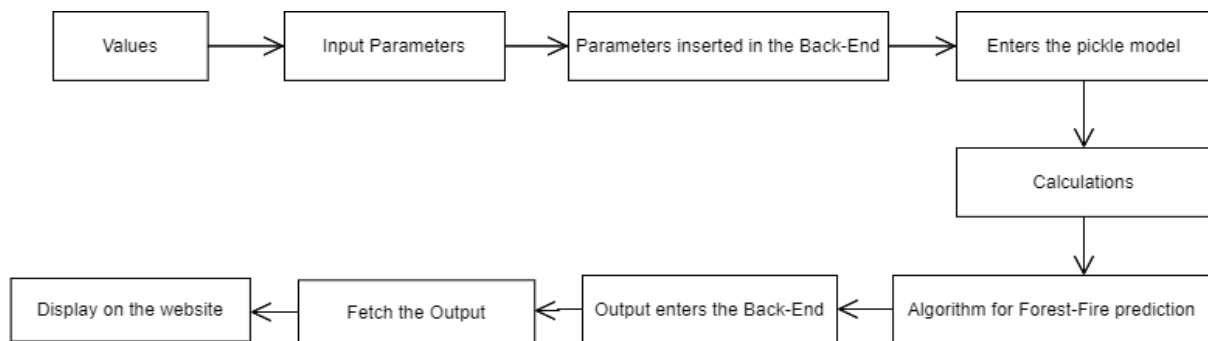
3.5 PRELIMINARY PRODUCT DESCRIPTION

The website will have following functions and operations:

- **HOME PAGE-** Prediction of the Forest fire/ Wildfire in a particular area by inserting the appropriate value of the parameters.
- **ABOUT US-** This page is all about the development of the website, the appropriate systems and researches that are done with this topic is briefly described here.
- **PREVENTIVE MEASURES-** This page shows the preventive measures which are to be taken at the time of the wildfire.
- **NEWS-** When the user/client visits this page, there will be displayed all the actions taken by the FOREST ORG. and DEPT. till date, additional with the news related to it.
- **EVENTS-** This page is about the events related to and conducted by all round organizations. The user can enroll easily from here to whichever event they might like.
- **ONLINE SAFARI BOOKING-** As the user enters this page of the website, he/she has to register or login and once done can visit more pages of this subdomain like Tariff details, Safari Forests in India, Book Online safari and much more.
- **CONTACT US-** When the user gets on this page, the user can enter its own details and subscribe to the website for daily information related to forest fires. There's also a section of Enquiry on this page, which will be needed when the user has an urge to ask a question.

3.6 CONCEPTUAL MODELS

★ HOME PAGE

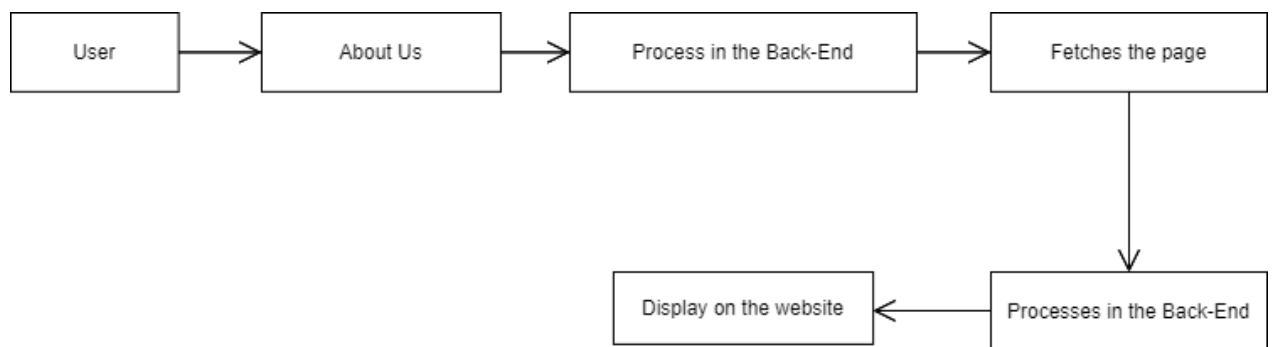


Conceptual model for HOME page

The Conceptual Model will abstractly explain the function of the web application and what concepts you should be aware of to use the web application. The development of the Conceptual Model is not based on the User Interface of the Website. It will only speak or convey the concepts within the web application and the relationships between those concepts.

- 1) Inserting the accurate input values to the parameters.
- 2) The parameters then are being transferred to the pickle model through the back-end process.
- 3) In the pickle model, I have used the Support vector machine algorithm along with Mean Absolute Deviation and Root Mean SquareError.
- 4) The Algorithm will then give the suitable output of the inserted parameters to the pickle file, which will then be transferred to the back-end of the website.
- 5) The output will be fetched and displayed on the website, accordingly.

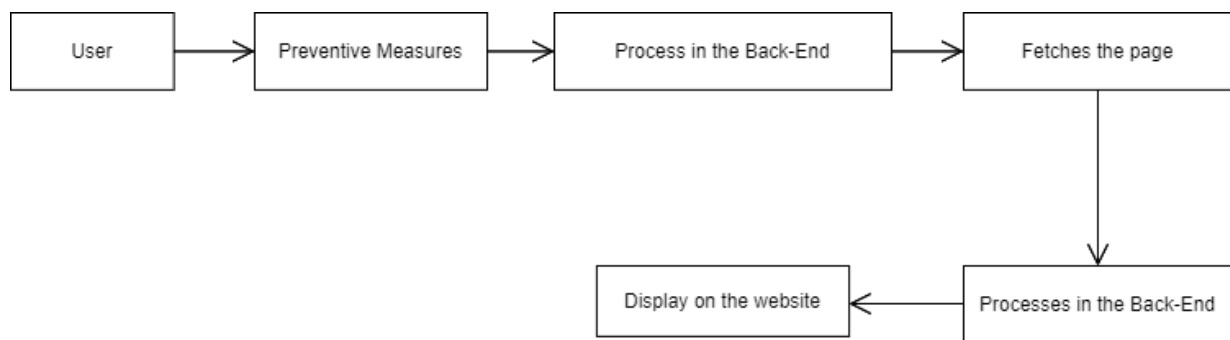
★ ABOUT US



Conceptual model for ABOUT US page

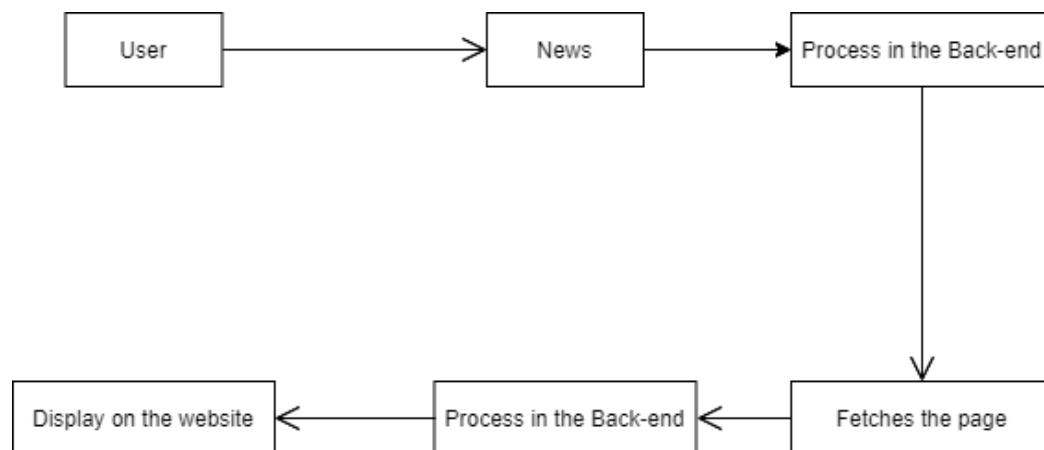
- 1) User gets on the About Us page from any of the pages on the website.
- 2) The action is then implemented on the Back-End process and the fetching of the selected page begins to be fetched.
- 3) The fetched page then begins to process in the back-end and then loads on the server.
- 4) The page is then displayed on the website.

★ PREVENTIVE MEASURES



Conceptual Model for PREVENTIVE MEASURES page

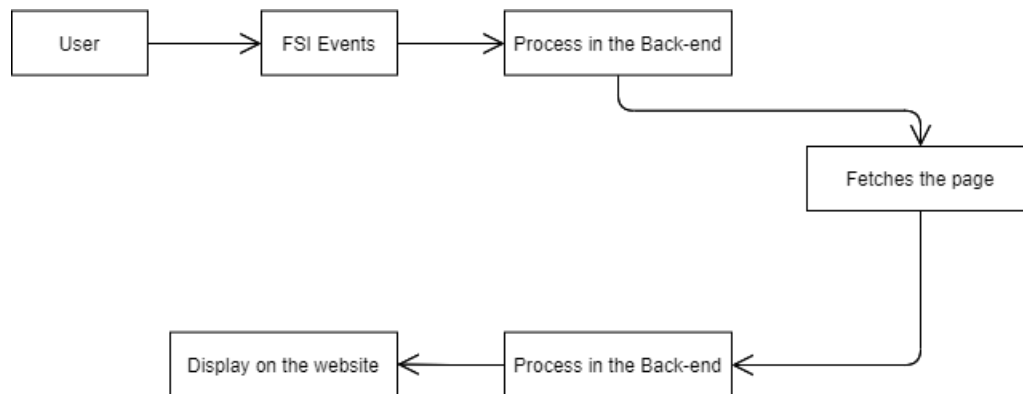
- 1) User gets on the Preventive Measures page from any of the pages on the website.
- 2) The action is then implemented on the Back-End process and the fetching of the selected page begins to be fetched.
- 3) The fetched page then begins to process in the back-end and then loads on the server.
- 4) The page is then displayed on the website.

★ NEWS

Conceptual Model for NEWS page

- 1) User gets on the News page from any of the pages on the website.
- 2) The action is then implemented on the Back-End process and the fetching of the selected page begins to be fetched.
- 3) The fetched page then begins to process in the back-end and then loads on the server.
- 4) The page is then displayed on the website.

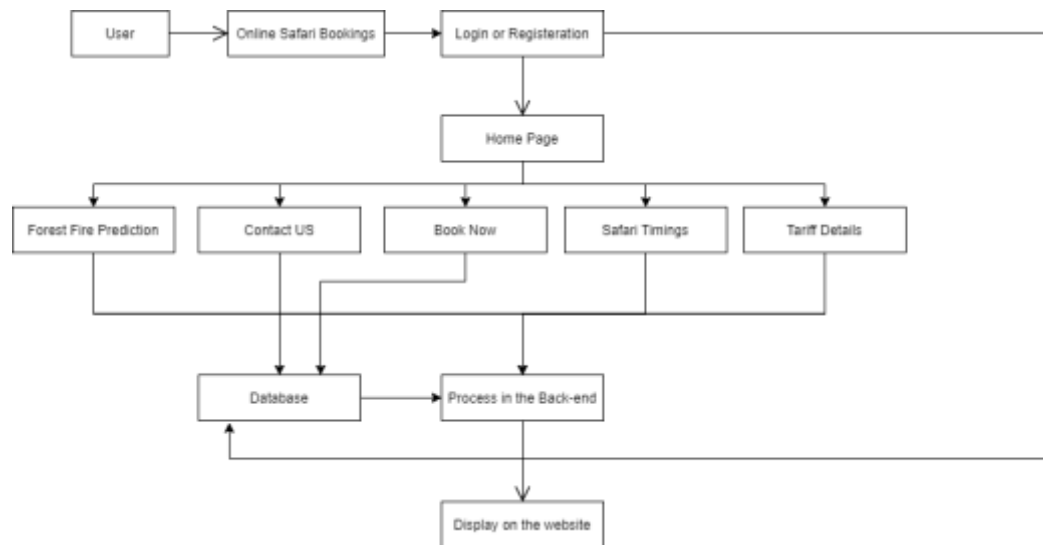
★ EVENTS



Conceptual Model for Events page

- 1) User gets on the Events page from any of the pages on the website.
- 2) The action is then implemented on the Back-End process and the fetching of the selected page begins to be fetched.
- 3) The fetched page then begins to process in the back-end and then loads on the server.
- 4) The page is then displayed on the website.

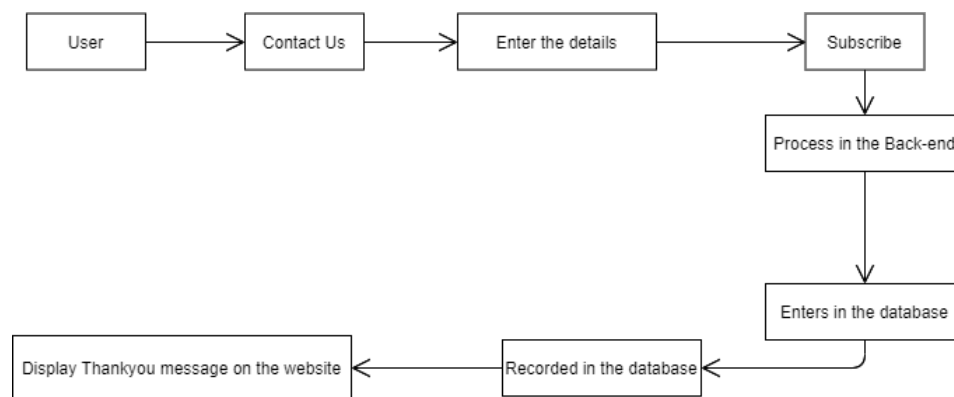
★ ONLINE SAFARI BOOKINGS



Conceptual Model for Online Safari Booking page

- 1) When the user enters from the website to the Online Safari Bookings page, the user has to first login or register to proceed further to the Home Page.
- 2) The Home Page displays the information of several Forests around India. The user is now free to access the rest of the pages, including safari timings, Tariff details.
- 3) As the user enters the page, Contact Us and Book now the user enters the details which will be stored in the database.
- 4) The user can book Online Forest Safari when entering this page by registering or logging in with appropriate details.

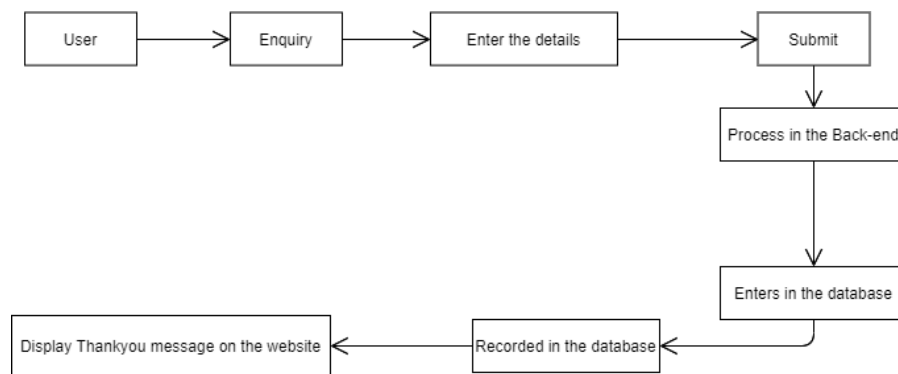
★ CONTACT US



Conceptual Model for Contact Us page

- 1) When the user enters the Contact us from any of the pages from the website, the first thing user sees is the Subscription form
- 2) The user fills the form marking it as a subscription to the website.
- 3) The information of the user then gets to the html file which transmits it to the database.
- 4) The details of the user are then recorded in the database and then the “Thankyou” message is displayed on the screen.

ENQUIRY



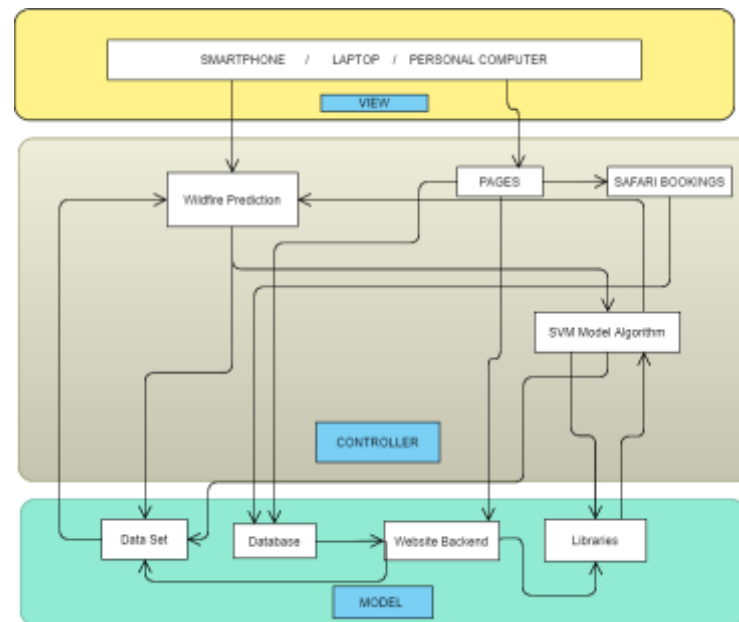
Conceptual model for Enquiry section

- 1) When the user enters the Contact us from any of the pages from the website, the first thing the user sees is the Subscription form and beside that a section of Enquiry.
- 2) The user fills the form with the question to get the information or knowledge about and submitting it to the website..
- 3) The information of the user then gets to the html file which transmits it to the database.
- 4) The details of the user and the question are then recorded in the database and then the “Thankyou” message is displayed on the screen.

CHAPTER 4

SYSTEM DESIGN

4.1 BASIC MODULES



Basic Module (System Architecture) of Forest Fire Prediction

View: The top layer is where the end-user communicates with the application through clicking buttons, typing details, selecting radio buttons, uploading songs, etc. This layer is responsible for displaying all data or a portion of data to the user based on the requirement of the application. This layer also acts as a bridge between the user and application itself.

Controller: This middle layer of the application contains the business logic, and the main functionality of the application. As soon as the user interacts with the application, the response is processed in this layer. From predicting wildfires to displaying activities, all the functions that run in the background belong to this layer. This mainly consists of all the functions and Logistic Regression model algorithm which helps in segregating activities and options and sending output to the view layer.

Model: This layer is responsible for maintaining the user's data. This has a Dataset where the data is stored for the algorithm, a temporary storage until the

output is displayed on the screen and also libraries that are necessary for the model to run and predict the wildfire or forest fire.

4.2 DATA DESIGN

4.2.1 DATA INTEGRITY & CONSTRAINTS:

Data Integrity is having correct and accurate data in your dataset and database. When we are storing data in the data set we don't want repeating values, we don't want incorrect values or broken relationships between modules. It is also keeping our data safe from getting corrupted. It incorporates the use of data structures, smart features and processes that restrict unauthorized access and keep data inaccessible to others who may use it for harmful purposes.

Risk to data integrity can easily be eliminated by doing the following:

- Limiting access to only a few people.
- Entering valid date and validating data to make sure it's correct both ways when it's gathered and used.
- Backing up data
- Using a Structured database to keep track of when the data is added and when it's used.

Constraints are the rules enforced on the data columns of a table. These are used to limit the type of data that can go into a table. This ensures the accuracy and reliability of the data in the database or dataset.

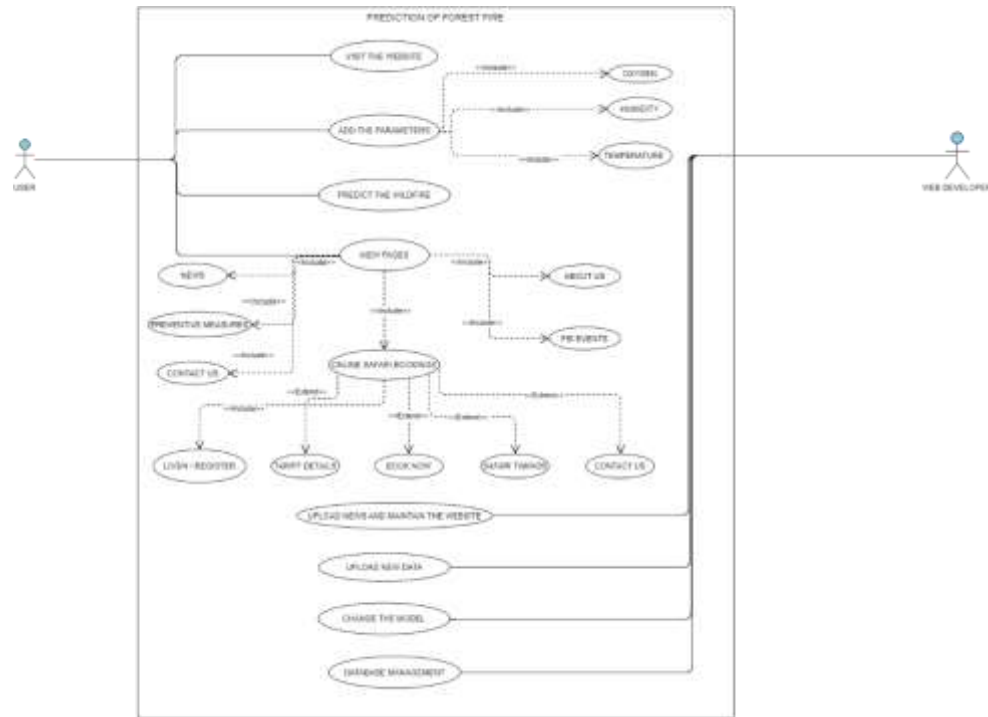
Some Constraints used in the database tables are:

- NOT NULL- Ensures that a column cannot have a Null value.
- PRIMARY KEY- A Primary key is a field which uniquely identifies each row in a table. The PRIMARY KEY is used mainly to enforce the entity integrity of the table. Entity integrity ensures that each row in the table is a uniquely identifiable entity.
- FOREIGN KEY- A foreign key is a set of attributes in a table that refers to the primary key of another table. The foreign key links these two tables.

4.3 PROCEDURAL DESIGN

4.3.1 LOGIC DIAGRAMS

➤ USE CASE

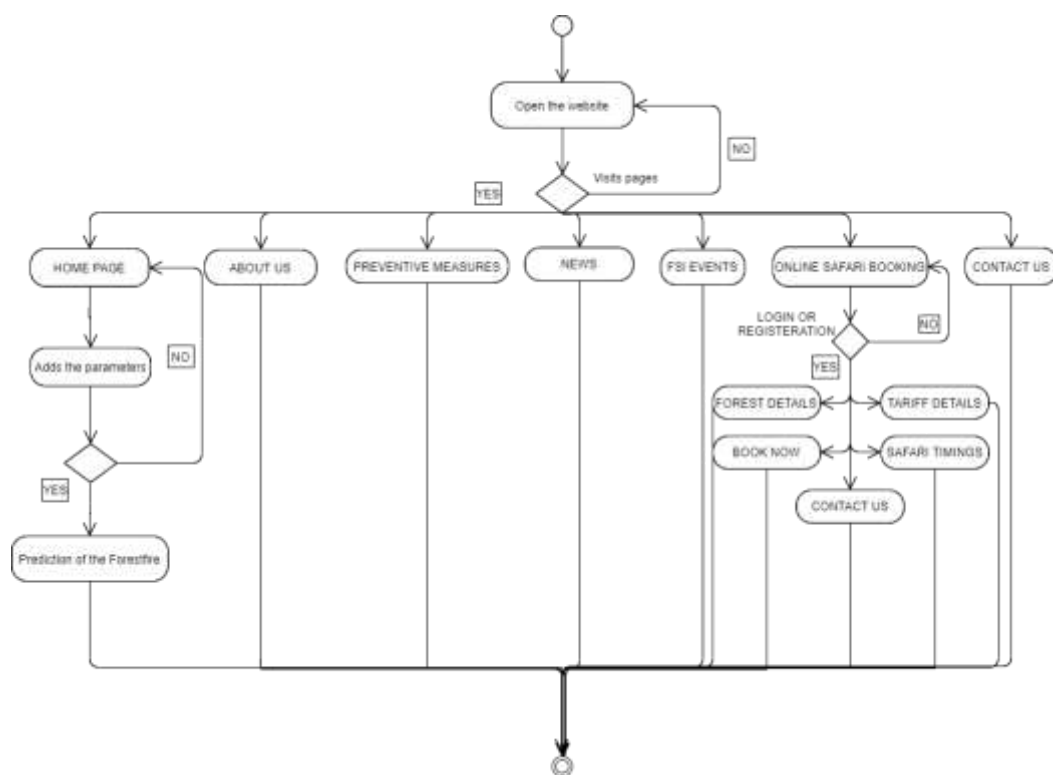


Use Case Diagram

- A use case diagram is a dynamic or behaviour diagram in UML. Use case diagrams model the functionality of a system using actors and use cases. Use cases are a set of actions, services, and functions that the system needs to perform.
- A "system" is something being developed or operated, such as a Web site.
- The "actors" are people or entities operating under defined roles within the system.
- The user is accessed in the website to visit the website, add the input values to get the predicted value or output of the wildfire in a particular region and also visit other pages of the website to check more about the News, Contact Us, Preventive Measures, Events, About Us.
- The View pages use case also involves or includes Online Safari Bookings where the user has to first login and then book the safari, there are several subpages like checking Safari Timings or Tariff details or even checking more about the Safari forests of India.

- The web developer is responsible for uploading new and updated data, changing the machine learning algorithm/model when the need be and maintaining the website.
- The purposes of use case diagrams can be said to be as follows –
 1. Used to gather the requirements of a system.
 2. Used to get an outside view of a system.
 3. Identify the external and internal factors influencing the system.
 4. To show the interaction among the requirements and actors.

➤ ACTIVITY DIAGRAM



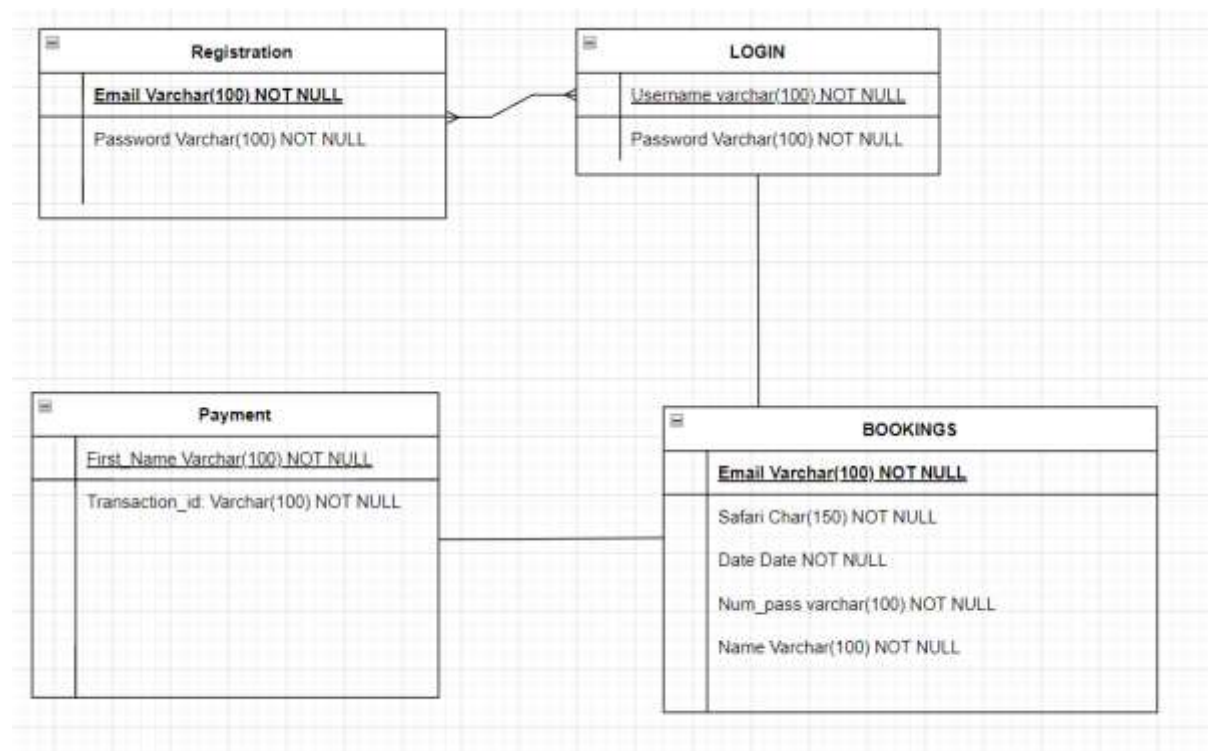
Activity Diagram (Working of Modules)

- Activity diagrams illustrate the dynamic nature of a system by modelling the flow of control from activity to activity.
- Activity is a particular operation of the system. Activity diagrams are not only used for visualizing the dynamic nature of a system, but they are also used to construct the executable system by using forward and reverse engineering techniques.
- Activity diagram consists of a beginning (an initial state) and an end (a final state).

- Here in this website, as the user enters the website he/she has the choice to enter several pages at once:
 1. HOME: Home page is where the user can predict the appearance or probability of Forest fire in their area.
 2. ABOUT US: When the user or client enters this page, he/she will find much information about the developer of this project and researches related to this field.
 3. PREVENTIVE MEASURES: When the user enters this page, they'll get to see the preventive measures which will be needed to take while in the time of emergency.
 4. NEWS: As the user enters this page of the website, the user can navigate through different pages including: FOREST FIRE ACTIVITIES, FOREST FIRE VULNERABILITY, FOREST FIRE FOCUS AREAS.
 5. EVENTS: When the user enters this page the user will see the events that are held every year by Forest Survey of India.
 6. ONLINE SAFARI BOOKING: When the user enters this page from the forest Fire prediction website, he/she has to login with the appropriate details and then this page has several subpages of its own like:
 - FOREST DETAILS: The details and information about the Safari Forests.
 - TARIFF DETAILS
 - BOOK NOW: The user visits here and books the safari by selecting the safari forest place which he/she has to visit, adding the date and then also by choosing the number of passengers while the forest safari. When the submit button is clicked, the payment portal is opened and by entering the details and clicking on submit again, finally the Safari will be booked.
 - SAFARI TIMINGS
 - CONTACT US
 7. CONTACT US: The user visits this webpage when the user wants to contact the web developer for either subscription or enquiry.

- The purpose of an activity diagram can be described as –
 1. Draw the activity flow of a system.
 2. Describe the sequence from one activity to another.
 3. Describe the parallel, branched and concurrent flow of the system.

➤ ER DIAGRAM

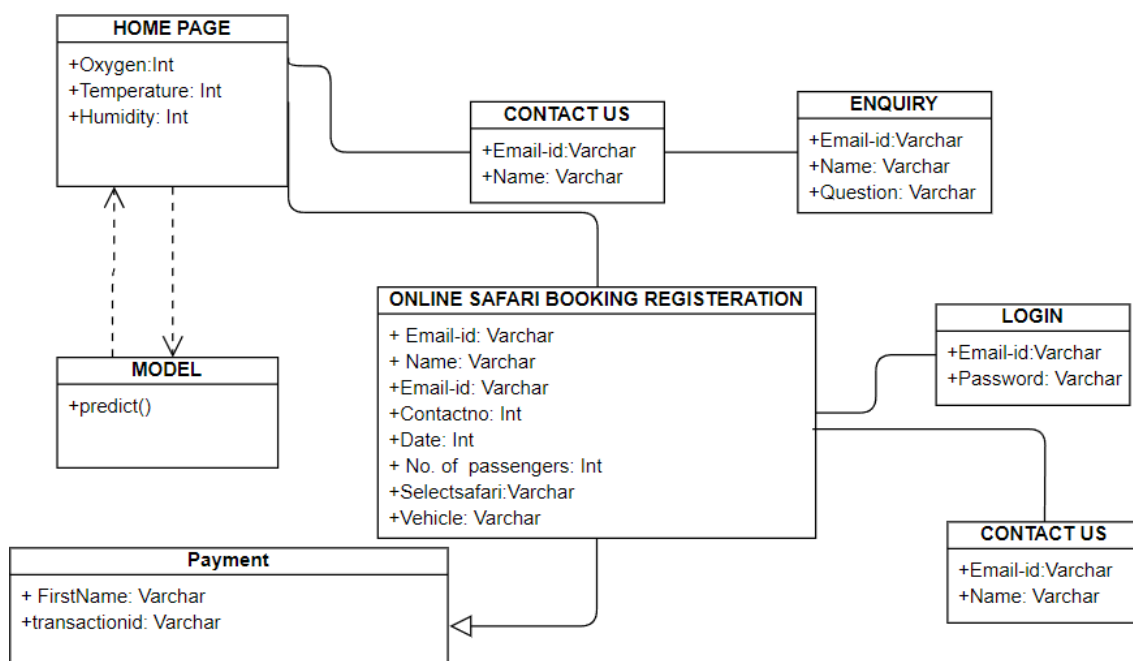


ER diagram of tables in the Safari database

- REGISTRATION: The primary key here is Username with data type Varchar and Constraint as NOT NULL and the rest in the table is appropriate values which will be filled by the user when the registration is taking place.
- LOGIN: The foreign key will be the Username which is the primary key in the Registration Table.
- CATEGORY: The category table will be filled with the Safari Forests options and Safari is the primary key in the table with data type as Varchar and constraint as NOT NULL.

- **PAYMENT:** This table will be filled with the payment details after the user has entered the safari details.
- **BOOKINGS:** The foreign key in this table is the username from the registration table and Safari from the category table.
- The purpose of an ER diagram is as follows:
 1. Helps you to define terms related to entity relationship modelling.
 2. Helps to describe entities, attributes, relationships.

➤ CLASS DIAGRAM



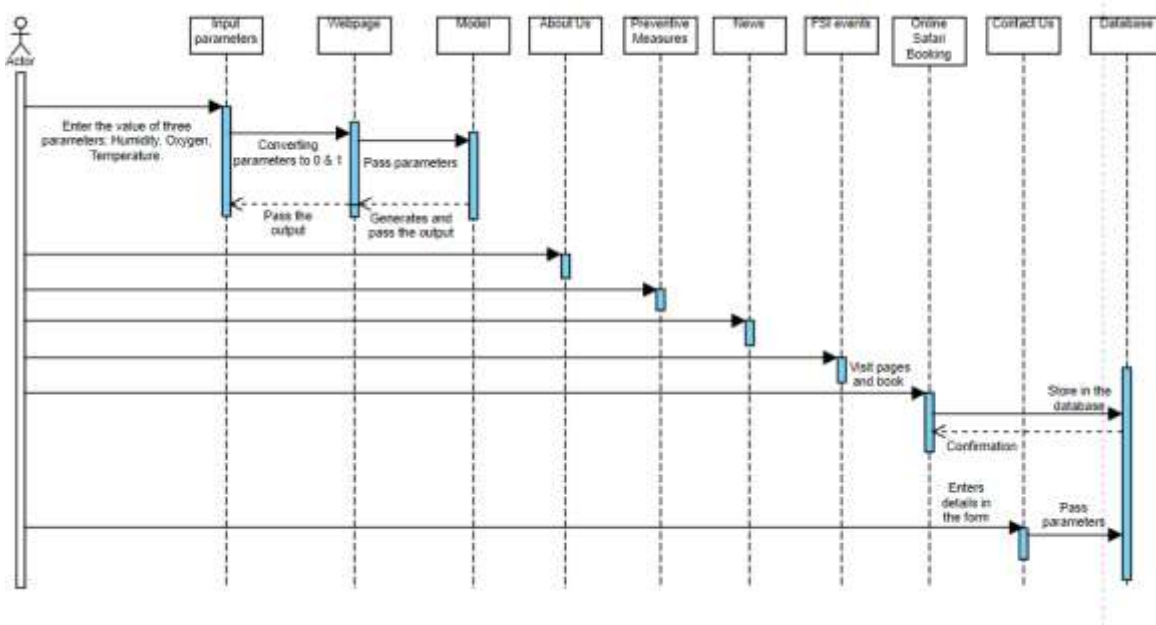
Class Diagram

- A class diagram is primarily designed for developers to provide the conceptual model and architecture of the system being developed. Typically, a class diagram consists of more than one class or all the created classes for a system.
- Class diagram describes the attributes and operations of a class and also the constraints imposed on the system. The shape of a class consists of a rectangle with two rows. The top row contains the name of the class, the

middle row contains the attributes of the class. Classes and subclasses are grouped together to show the static relationship between each object.

- Here basically my homepage has six attributes which will be the parameters for the model, with the function predict() in the model. Forest Fire Prediction website also includes a Contact us page and within it it has an Enquiry page with attributes name, email-id and question only for enquiry.
- When the user enters the Online Safari Bookings page, the user can see the login page and can login by entering the username and password. If not logged in, then the user is free to register anytime on the website.
- Once registered, the user can see the home page, Tariff details, Safari timings and can easily book the safari by entering appropriate details and also can visit the contact us page for any enquiries.
- The purpose of a class diagram is as follows:
 1. Better understanding of the concept for the developer.
 2. Represents the static view of an application.

➤ SEQUENCE DIAGRAM



Sequence Diagram

- The sequence diagram represents the flow of messages in the system and is also termed as an event diagram. It helps in envisioning several dynamic

scenarios. It portrays the communication between any two lifelines as a time-ordered sequence of events, such that these lifelines took part at the run time.

- In UML, the lifeline is represented by a vertical bar, whereas the message flow is represented by a vertical dotted line that extends across the bottom of the page. It incorporates the iterations as well as branching.
- The Purpose of Sequence Diagram is as follows:
 1. To model high-level interaction among active objects with a system.
 2. To model interaction of objects within a collaboration realizing a use case.
 3. Implements both forward and backward engineering.

➤ WIREFRAME



FOREST FIRE PREDICTION

[HOME](#) [ABOUT US](#) [PREVENTIVE MEASURES](#) [NEWS](#) [FSI EVENTS](#) [ONLINE SAFARI BOOKINGS](#) [CONTACT US](#)

NEWS

Forest fire activities, focus areas and vulnerability of forest fires



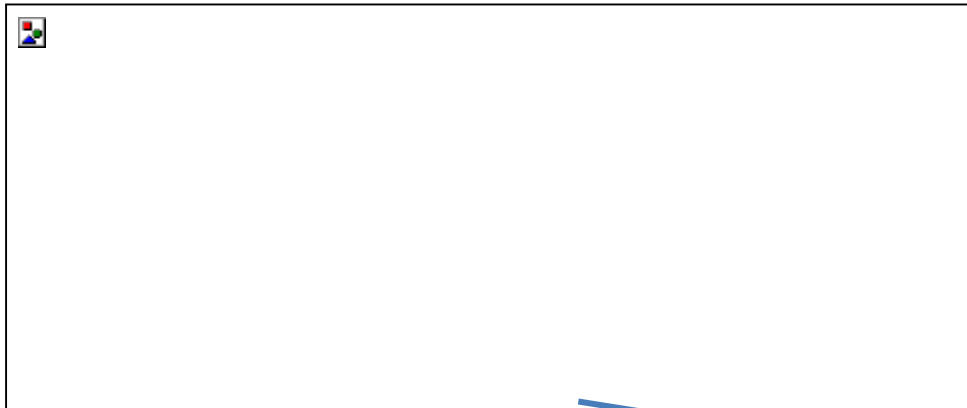
FOREST FIRE PREDICTION	
HOME	ABOUT US PREVENTIVE MEASURES NEWS FSI EVENTS ONLINE SAFARI BOOKINGS CONTACT US
CONTACT US	
<div> <input type="text"/> </div> <div> <input type="text"/> </div> <div> <input type="button" value="SUBSCRIBE"/> </div>	<div>ENQUIRY</div> <div> <input type="text"/> </div> <div> <input type="text"/> </div> <div> <input type="text"/> </div> <div> <input type="button" value="SUBMIT"/> </div>

ONLINE SAFARI BOOKING:



ONLINE SAFARI BOOKINGS				
FOREST FIRE PREDICTION	TARIFF DETAILS	BOOK NOW	SAFARI TIMINGS	CONTACT US

TARIFF DETAILS



SAFARI TIMINGS



CONTACT US

Or Mail Us at:

4.3.2 DATA STRUCTURE

The Firebase Realtime database is a cloud-hosted NoSQL database that lets you store and sync between users. Real Time syncing makes it easy for users to access their data from any device. Database makes it easier for the developer to check in with all the tables and helps to keep them in sync.

DATA TABLE

➤ TRAINING TABLE:

Data item	Data type	Data constraint
Humidity	Integer	Not null
Oxygen	Integer	Not null
Temperature	Integer	Not null
Fire Occurrence	Integer	Not null

Training table for the Prediction model

Data set is a collection of data. In other words, a data set corresponds to the contents of a single database table, or a single statistical data matrix, where every column of the table represents a particular variable, and each row corresponds to a given member of the data set in question. In Machine Learning projects, we need a training **data set**. It is the actual **data set** used to train the model for performing various actions like prediction, regression, classification and so on.... Training sets make up the majority of the total data, around 60 %. In testing, the models are fit to parameters in a process that is known as adjusting weights. The model then uses the training sets to learn and adapt to the conclusion. The training data set is the one used to train an algorithm to understand how to apply concepts such as neural networks and algorithms, to learn and produce results. It includes both input data and the expected output.

➤ TEST TABLE:

Data item	Data type	Data constraint
Humidity	Integer	Not null
Oxygen	Integer	Not null
Temperature	Integer	Not null

Testing table for the Prediction model

A simple evaluation method is a train test dataset where the dataset is divided into a train and a test dataset, then the learning model is trained using the train data and performance is measured using the test data. In a more sophisticated approach, the entire dataset is used to train and test a given model.

In most of the projects, we don't use the training data set in the testing stage because the algorithm will already know in advance the expected output which is not our goal.

➤ CONTACT US SUBSCRIPTION TABLE:

Data item	Data type	Data constraint
Name	Varchar	Not null
Email	Varchar	Not null

Contact Us database table

The table Contact Us in the database has the following attributes Name with datatype Varchar and Constraint as Not Null, EmailId with data type Varchar and constraint Not Null.

➤ CONTACT US ENQUIRY TABLE:

Data item	Data type	Data constraint
Name	Varchar	Not null
Email	Varchar	Not null
Question	Varchar	Not null

Enquiry database table

The table Enquiry in the database has the following attributes Name with data type Varchar Not Null, Email-Id with data type Varchar and constraint Not Null and Question with data type Varchar and constraint Not Null

➤ REGISTRATION TABLE:

Data item	Data type	Data constraint
Email-Id	Varchar	Not null
Password	Varchar	Not null

Registration database table

The table Registration in the database has the following attributes EmailId with data type Varchar and constraint Not Null, Password with data type Varchar and data constraint as Not null.

➤ LOGIN TABLE:

Data item	Data type	Data constraint
Email-Id	Varchar	Not null
Password	Varchar	Not null

Login database table

The table Login in the database has the following attributes Email-Id with data type Varchar and constraint as Not Null and password with data type Varchar and data constraint as Not null.

➤ CONTACT US SUBSCRIPTION TABLE:

Data item	Data type	Data constraint
Name	Varchar	Not null
Email	Varchar	Not null

Contact Us database table

The table Contact Us in the database has the following attributes Name with datatype Varchar and Constraint as Not Null, EmailId with data type Varchar and constraint Not Null.

➤ CONTACT US ENQUIRY TABLE:

Data item	Data type	Data constraint
Name	Varchar	Not null
Email	Varchar	Not null
Question	Varchar	Not null

Enquiry database table

The table Enquiry in the database has the following attributes Name with data type Varchar Not Null, Email-Id with data type Varchar and constraint Not Null and Question with data type Varchar and constraint Not Null

➤ BOOKINGS TABLE:

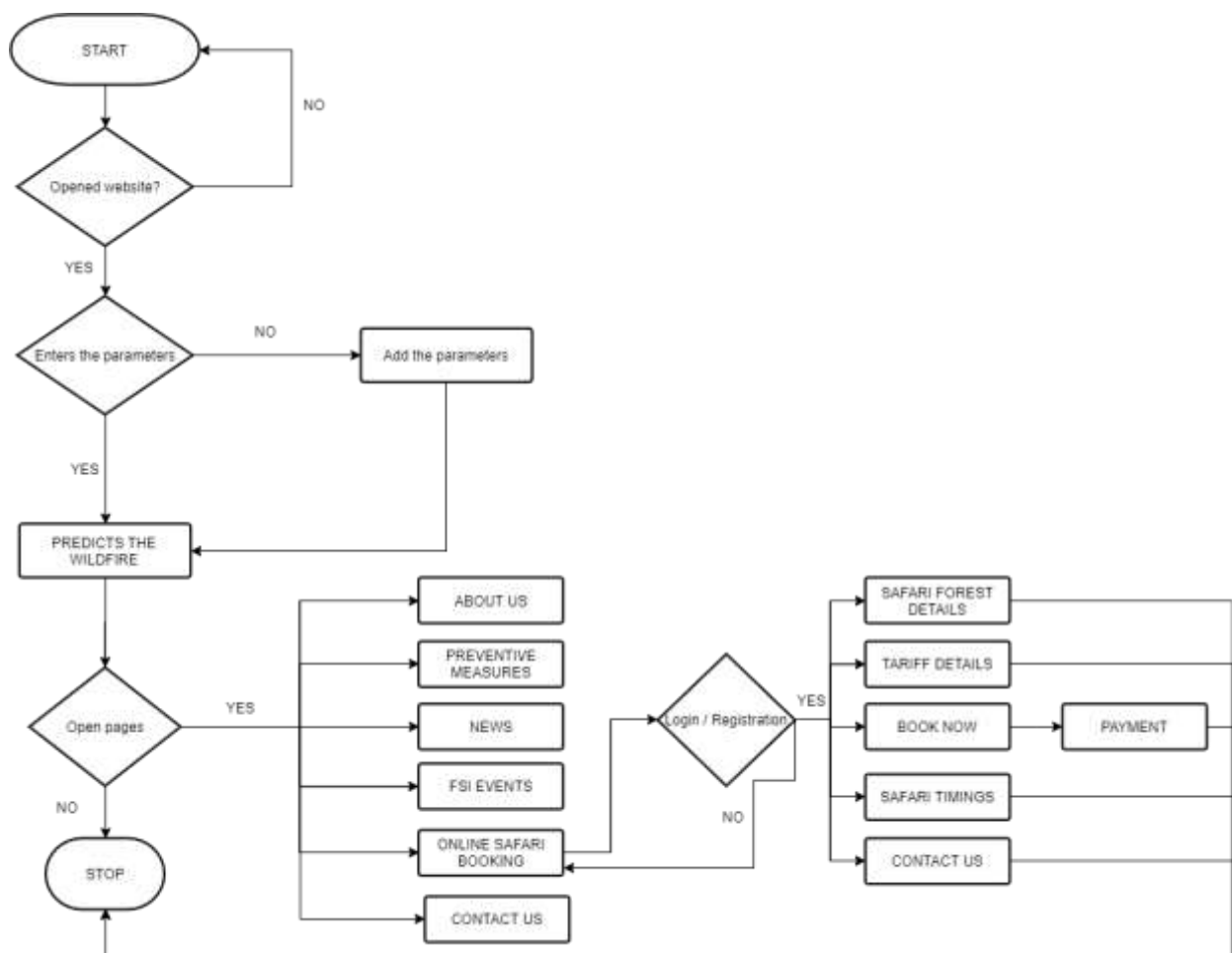
Data item	Data type	Data constraint
Name	Varchar	Not null

Email-Id	Varchar	Not null
Date	Date	Not null
No. of passengers	Varchar	Not null
Safari Forests	Char	Not null
Slots	Varchar	Not null
Amount	Integer	Not null, read only
Vehicle	Varchar	Not null

Bookings database table

This table is responsible for taking user values and storing them in the database while booking a safari.

4.3.3 ALGORITHM DESIGN



Algorithm Diagram

Start

Step 1: If the user has opened the website, the user enters the next page otherwise the user returns to the previous step.

Step 2: The user enters the value of the parameters, if the user adds the parameters, the prediction of the wildfire will be the next step.

Step3: When the user adds the parameters, the wildfire or forest fire is predicted of a particular region.

Step 4: If the user is done with the home page, the user if wills can move to check out other pages like Events, News and also Online Safari booking. If not, then can close the website. Stop.

Step 5: If the user enters the Online Safari Booking page, then he or she has to register and login first and then can visit the subpages of this page like checking out safari timings, Tariff details and also booking an online safari by entering appropriate values. Stop

4.4 USER INTERFACE DESIGN

- HOME:



The home interface features a yellow header with the title "FOREST FIRE PREDICTION" in bold green text. Below the header is a navigation bar with links: HOME, ABOUT US, PREVENTIVE MEASURES, NEWS, FSI EVENTS, ONLINE SAFARI BOOKINGS, and CONTACT US. The main content area is titled "ENTER YOUR DATA" in bold black text. It contains three input fields labeled "OXYGEN", "TEMPERATURE", and "HUMIDITY", each with a green border. Below these fields is a green "PREDICT" button. At the bottom, there is a link that says "CHECK YOUR CITY DATA HERE".

- ABOUT US:



The about us interface features a yellow header with the title "FOREST FIRE PREDICTION" in bold green text. Below the header is a navigation bar with links: HOME, ABOUT US, PREVENTIVE MEASURES, NEWS, FSI EVENTS, ONLINE SAFARI BOOKINGS, and CONTACT US. The main content area is titled "ABOUT US" in bold black text.

- **PREVENTIVE MEASURES:**



PREVENTIVE MEASURES

- **NEWS:**



NEWS

Forest fire activities, focus areas and vulnerability of forest fires

- **EVENTS:**



The screenshot shows the 'FSI EVENTS' page of the 'FOREST FIRE PREDICTION' website. The header is yellow with the title in green. A navigation bar contains links: HOME, ABOUT US, PREVENTIVE MEASURES, NEWS, FSI EVENTS (highlighted in green), ONLINE SAFARI BOOKINGS, and CONTACT US. The main heading is 'FSI EVENTS' in bold black text, followed by 'FOREST SURVEY OF INDIA' and 'EVENTS' in a smaller font.

- **LOGIN FOR ONLINE SAFARI BOOKING:**



The screenshot shows the 'LOGIN' page of the 'FOREST FIRE PREDICTION' website. The header is yellow with the title in green. A navigation bar contains links: HOME, ABOUT US, PREVENTIVE MEASURES, NEWS, FSI EVENTS, ONLINE SAFARI BOOKINGS (highlighted in green), and CONTACT US. The main heading is 'LOGIN' in bold black text. Below it are two input fields: 'Email-id / Contact Number' and 'Password'. A green 'LOGIN' button is centered below the fields. At the bottom, there is a link 'New User? REGISTER'.

- **CONTACT US:**

FOREST FIRE PREDICTION

HOME ABOUT US PREVENTIVE MEASURES NEWS FSI EVENTS ONLINE SAFARI BOOKINGS **CONTACT US**

CONTACT US

Your Name

Your Email-id

SUBSCRIBE

ENQUIRY

Your Name

Your Email-id

Your Question

SUBMIT

ONLINE SAFARI BOOKING:

- **REGISTER:**

ONLINE SAFARI BOOKINGS

LOGIN

FOREST FIRE PREDICTIONTARIFF DETAILSBOK NOWSAFARI TIMINGSCONTACT US

REGISTER

Name

Email-id

Contact Number

Password

Confirm Password

REGISTER

- **LOGIN:**

ONLINE SAFARI BOOKINGS

LOGIN

FOREST FIRE PREDICTIONTARIFF DETAILSBOK NOWSAFARI TIMINGSCONTACT US

LOGIN

Email-id / Contact Number

Password

LOGIN

New User? REGISTER

- **HOME:**



- **TARIFF DETAILS**



- **BOOK NOW:**

ONLINE SAFARI BOOKINGS					LOGIN
FOREST FIRE PREDICTION	TARIFF DETAILS	BOOK NOW	SAFARI TIMINGS	CONTACT US	

BOOK NOW

- **PAYMENT:**

ONLINE SAFARI BOOKINGS					LOGIN
FOREST FIRE PREDICTION	TARIFF DETAILS	BOOK NOW	SAFARI TIMINGS	CONTACT US	

PAYMENT

- **SAFARI TIMINGS:**

ONLINE SAFARI BOOKINGS					LOGIN
FOREST FIRE PREDICTION	TARIFF DETAILS	BOOK NOW	SAFARI TIMINGS	CONTACT US	

SAFARI TIMINGS

- **CONTACT US:**

ONLINE SAFARI BOOKINGS					LOGIN
FOREST FIRE PREDICTION	TARIFF DETAILS	BOOK NOW	SAFARI TIMINGS	CONTACT US	

CONTACT US

<input type="text" value="Your Name"/>	Or Mail Us at:
<input type="text" value="Your Email-id"/>	
SUBMIT	

4.5 SECURITY ISSUES

- 1) Illegally access and use another user's credentials. Example:
Impersonating to act like someone else.
Solution: Appropriate authentication
- 2) Data theft
Solution: Encryption

4.6 TEST CASES DESIGN

Test Case No	Test Case Description
1	Check response when the username is invalid and password is correct and is submitted.
2	Check response when the username is valid but the password is invalid and is submitted.
3	Check the response when the username and password, both are invalid and is submitted.
4	Check the response when the username and password, both are valid and is submitted.
5	Check the response when nothing is entered and is submitted.
6	Check the response when any one of the parameters is missing and is submitted.
7	Check the response when none of the parameters are entered and is submitted.
8	Check the response when all the parameters are entered and is submitted.
9	Check the response when doing registration, a detail parameter is missing or isn't entered and submitted.
10	Check the response when doing registration, two or more details aren't entered and submitted.
11	Check the response when none of the details are given and is submitted.

CHAPTER 5

IMPLEMENTATION & TESTING

5.1 IMPLEMENTATION APPROACHES

As per the implementation plan and process, it is evident that for implementing this project; there are four basic steps are required to be performed:

1. Processing & Validation- It is the operation where the numbers are first checked whether valid or invalid and whether the numbers are within the given input range or not.
2. Pickle model- The numbers entered in the boxes are then processed and then enters into the pickle model. Pickle is a module in Python used for serializing and de-serializing Python objects. This converts Python objects like lists, dictionaries, etc. into byte streams (zeroes and ones).
3. Prediction process- the prediction process is an important step in forest fire prediction and is defined as a process of learning and testing, where the Logistic Regression model automatically learns from itself while the user enters new data every time.
4. Booking a Safari- This process involves a basic idea of booking a ticket for a safari but in an online form after logging or registering on the website.

▽ The MODEL

Logistic regression is a statistical analysis method to predict a binary outcome, such as yes or no, based on prior observations of a data set. A logistic regression model predicts a dependent data variable by analysing the relationship between one or more existing independent variables. For example, logistic regression could be used to predict whether a political candidate will win or lose an election or whether a high school student will be admitted or not to a particular college. These binary outcomes allow straightforward decisions between two alternatives.

▽ MODEL VALIDATION

Performance, as it turns out, the final logistic regression model had an accuracy of 86.7%. This makes a lot of sense. Since the data that I fed to my algorithms consists of a combination of numbers, up and down.

▽ TRAINING AND TESTING DATABASE OR DATASET

In machine learning, the study and construction of algorithms that can learn from and make predictions on data is a common task. Such

algorithms work by making data-driven predictions or decisions, through building a mathematical model from input data.

A set of examples is used to fit the parameters of the model. The model is trained on the training dataset using a supervised learning method. In practice, the training dataset often consists of pairs of an input vector and the corresponding answer vector or scalar, which is commonly denoted as the target. The current model is run with the training dataset and produces a result, which is then compared with the target, for each input vector in the training dataset.

Successively, the fitted model is used to predict the responses for the observations in a second dataset called the validation dataset.

Validation datasets can be used for regularization by early stopping stop training when the error on the validation dataset increases, as this is a sign of overfitting to the training dataset.

Finally, the test dataset is a dataset used to provide an unbiased evaluation of a final model fit on the training dataset.

5.2 CODING DETAILS & CODE EFFICIENCY

5.2.1 CODE EFFICIENCY

○ INDEX PAGE (FOREST FIRE PREDICTION -HTML)

```
<h1 class="mainheader">Enter Your data</h1><br><br>
<form action="/predict", method="post" id="predform">
  <label for="temperature" id="temperatureheading">TEMPERATURE</label>
  <label for="oxygen" id="oxygenheading">OXYGEN</label>
  <label for="humidity", id="humidityheading">HUMIDITY</label><br>

  <input type="number" min="0" max="90" id="temperature"
name="temperature" placeholder="Temperature" required>
  <input type="number" min="0" max="90" id="oxygen" name="oxygen"
placeholder="Oxygen" required>
  <input type="number" min="0" max="90" id="humidity" name="humidity"
placeholder="Humidity" required>

  <input type="submit" id="predict" value="PREDICT">

</form>

<span><h4 class="multicolorhead">{{pred}} (On the Scale of 0-1)
</h4></span>
</div>
<div id="mydiv">
  <br><a class="predhead" href="https://www.accuweather.com/en/in/india-
weather" target="__blank"><h4>CHECK YOUR CITY DATA HERE!</h4></a></div>
```

○ FOREST FIRE PREDICTION-ALGORITHM

```
import pickle
import warnings

import numpy as np
import pandas as pd
from sklearn.linear_model import LogisticRegression
from sklearn.model_selection import train_test_split
#ignore the warnings if any comes into the case
warnings.filterwarnings("ignore")
#reading and fetching the csv file
data= pd.read_csv("forest_fire.csv")
#converting the data we have into a sequence of array 62as better calculation
data = np.array(data)
#allocating, slicing the array and converting them into int for assurance
X = data[1:, 1:-1] # take all from col 1 to bef Last col as input features
y = data[1:, -1] # take the last col
y = y.astype('int')
X = X.astype('int')
# print(X,y)
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.3,
random_state=0) #splitting the array or the file which we have converted into
array into testing and training size

#using the logistic rregression model among others since it is the best when
you have to give binary 62asswor as output and real number as inputs.
Log_reg = LogisticRegression()

#allocating the array with the logistic regression model
log_reg.fit(X_train, y_train)

62assw=[int(x) for x in "45 32 60".split(' ')]
final=[np.array(62assw)]

# Save our Model in pickle so that we can call on later
pickle.dump(log_reg,open('model.pkl','wb')) #allows writing
# Loading model to compare the results
model=pickle.load(open('model.pkl','rb'))#allows reading
```

○ FOREST FIRE PREDICTION- ROUTING & UNLOADING

```

from flask import Flask,request, url_for, redirect, render_template
import pickle
import numpy as np

app = Flask(__name__)

model=pickle.load(open("D:\Forest_Fire_Prediction\model.pkl",'rb'))

#homepage
@app.route('/')
def home():
    return render_template("index.html")

@app.route('/templates/index.html')
def indexing():
    return render_template('index.html')

@app.route('/predict',methods=['POST'])
def predict():
    int_features=[int(x) for x in request.form.values()]
    final=np.array(int_features)
    print(int_features)
    print(final)
    prediction=model.predict_proba(final)
    output='{0:.{1}f}'.format(prediction[0][1], 2)

    if output>str(0.5):
        return render_template('index.html',pred='Your Forest is in
Danger.\nProbability of fire 63assword63 is {}'.format(output),wowhow="Your
forest is in danger")
    else:
        return render_template('index.html',pred='Your Forest is safe.\n
Probability of fire 63assword63 is {}'.format(output),wowhow="Your Forest is
Safe for now")

#aboutus page
@app.route('/templates/about.html')
def about():
    return render_template('about.html')

#contactus page
@app.route('/templates/contact.html')
def contact():
    return render_template('contact.html')

#fsi events page

```



```

@app.route('/templates/fsi.html')
def fsi():
    return render_template('fsi.html')

#news page
@app.route('/templates/news.html')
def news():
    return render_template('news.html')

#prev
@app.route('/templates/Prev.html')
def prev():
    return render_template('prev.html')
#onlinebookingeventspage
@app.route('/templates/onlinesafaribooking.html')
def online():
    return render_template('onlinesafaribooking.html')

#tariffpage
@app.route('/templates/tariff.html')
def Tar():
    return render_template('tariff.html')

#saftimepage
@app.route('/templates/saftime.html')
def stime():
    return render_template('saftime.html')

#safconpage
@app.route('/templates/safcon.html')
def scon():
    return render_template('safcon.html')

#bookingpage #loginfirst
@app.route('/templates/login.html')
def log():
    return render_template('login.html')

#registerpage
@app.route('/templates/register.html')
def Reg():
    return render_template('register.html')

#booknowpage
@app.route('/templates/booknow.html')
def Booknow():
    return render_template('booknow.html')

```

```
#confirmpage
@app.route('/templates/confirm.html')
def confirmation():
    return render_template('confirm.html')

if __name__ == '__main__':
    app.run(debug=True)
```

○ CONTACT US

```
<h2 class="box3heading">CONTACT US</h2><br></div><br>
<div class="rectangle2">
    <h2 id="enquiry">ENQUIRY </h2>
    <div class="alert">Your message has been sent!!</div>
    <form id="contactForm">

        <input type="text" id="yourname" name="yourname"
placeholder="Your Name" pattern="[a-zA-Z]*" required>

        <input type="email" id="yourmail" name="yourmail"
placeholder="Your Email-id " required >

        <textarea id="yourmessage" name="message" placeholder="Your
Question" pattern="[a-zA-Z]*" required></textarea>
        <input type="submit" id="yoursubmit" value="submit">
    </form>
</div>

<div class="rectangle1">
    <h2 id="subscribeheading">" SUSBCRIBE TO US NOW "</h2>
    <div class="alert1">Thankyou for subscribing to this website!</div>

    <form id="subscribeForm" >
        <input type="text" id="thename" name="thename" placeholder="Your
Name" required>

        <input type="email" id="themail" name="themail" placeholder="Your
Email-id " required>

        <input type="submit" id="subscribe" value="subscribe">
    </form>
</div>
```

O LOGIN PAGE

```

<div id="loginforms" onsubmit="login()" >
  <div class="loginform">
    <div class="title">LOGIN</div>
    <div class="registerlink" >New User?<a
href="../templates/register.html"> Register Here</a></div>
    <div class="inputboxes">
      <div class="inputbox">
        <i class="fas fa-user"></i>
        <input id="66asswor" type="text" placeholder="Enter your
Email-Id"></div>
      <div class="inputbox2">
        <i class="fas fa-key"></i>
        <input id="passwd" type="password" placeholder="Enter your
Password"></div>
      <div id="button_container">
        <button id="buttonlog" type="submit"
onclick="login()">LOGIN</button>
      </div>
    </div>
  </div>
</div>

<script src="https://www.gstatic.com/firebasejs/9.6.1/firebase-app-
compat.js"></script>
<script src="https://www.gstatic.com/firebasejs/9.6.1/firebase-auth-
compat.js"></script>
<script src="https://www.gstatic.com/firebasejs/9.6.1/firebase-database-
compat.js"></script>
<script src="../static/js/loginreg.js"></script>
<script src="../static/js/book.js"></script>
<script>
  document.getElementById("loginforms").addEventListener("submit"
,(event)=>{
    event.preventDefault()
  })

auth.onAuthStateChanged(function(user){
  if (user) {
    location.replace("bookknow.html")
  }
});
</script>

```

○ REGISTRATION PAGE

```

<div class="title">REGISTER</div>
    <div class="loginlink">Already a User?<a
href="../templates/login.html"> Login Here</a></div>
    <div class="inputboxes">
        <div class="inputbox">
            <i class="fas fa-user"></i>
            <input id="67asswor" type="text" placeholder="Enter your
Email-Id"></div>
            <div class="inputbox2">
                <i class="fas fa-key"></i>
                <input id="passwd" type="password" placeholder="Enter your
Password"></div>
            <div id="button_container">
                <button id="buttonreg" type="submit"
onclick="register()">REGISTER</button>
            </div>
        </div>
    </div>
</form>
</div>

<script src="https://www.gstatic.com/firebasejs/9.6.1/firebase-app-
compat.js"></script>
<script src="https://www.gstatic.com/firebasejs/9.6.1/firebase-auth-
compat.js"></script>
<script src="https://www.gstatic.com/firebasejs/9.6.1/firebase-database-
compat.js"></script>
<script src="../static/js/loginreg.js"></script>
<script>
    document.getElementById("regforms").addEventListener("submit"
,(event)=>{
        event.preventDefault()
    })
    auth.onAuthStateChanged(function(user){
        if (user) {
            location.replace("booknow.html")
        }
    });
</script>

```

○ BOOK NOW PAGE

```

<h2 class="box3heading">BOOK NOW</h2><br></div>
  <div class="formcontainer">
    <form method="post" action="./confirm.html" id="bookform" >
      <div class="inputbox1">
        <input id="name" type="text" placeholder="Enter your name"
pattern="[a-zA-Z]*" required>
      </div>
      <div class="inputbox2">
        <input id="68asswor" type="email" placeholder="Enter your Email-
Id" required>
      </div>
      <div class="inputbox3">
        <input id="contactno" type="tel" placeholder="Enter your Phone
number" pattern="[0-9]{3}[0-9]{3}[0-9]{4}"required>
      </div>

      <div class="inputbox4">
        <select id="passengers" onchange="calculateAmount(this.value)"
required>
          <option value="0" disabled>No. of Passengers</option>
          <option value="1">1</option>
          <option value="2">2</option>
          <option value="3">3</option>
          <option value="4">4</option>
          <option value="5">5</option>
          <option value="6">6</option>
          <option value="7">7</option></select>

        <input type="date" id="userdate" required></div>

      <div class="inputbox6">
        <select id="slots" required>
          <option value="slot" disabled >Slots available</option>
          <option value="Morning 9am-1pm">Morning 9am-1pm</option>
          <option value="Afternoon 12pm-4pm">Afternoon 12pm-4pm</option>
          <option value="Evening 2pm-6pm">Evening 2pm-6pm</option>
        </select>

        <select id="vehicle" required>
          <option value="vehicletype" disabled >Vehicle Type</option>
          <option value="MiniBus">Mini Bus</option>
          <option value="Gypsy">Gypsy</option>
        </select>
      </div>
      <div class="inputbox5">
        <select id="forests" name="forests" required>
          <option value="foreststype" disabled >Safari Forests</option>

```

```

        <option value="SanjayGandhi">Sanjay Gandhi</option>
        <option value="GorewadaJungleDrive">Gorewada Jungle
Drive</option>
        <option value="PenchTigerReserve">Pench Tiger Reserve</option>
    </select>
</div>
<div class="inputbox9">
    <input id="amount" placeholder="Amount" readonly >
</div>
    <input type="submit" id="booksubmit" value="submit"
onclick="handleSubmit()" onclick="validate_passengers()" required>
</form></div>
</div><br></div>
    <script src="https://cdnjs.cloudflare.com/ajax/libs/firebase/7.14.1-
0/firebase.js"></script>
<script src="../static/js/home.js"></script>
<script src="../static/js/book.js"></script>
<script src="../static/js/payment.js"></script>
<script>

    firebase.auth().onAuthStateChanged(function(user){
    if (!user) {
        location.replace("login.html")
    }
    });

function calculateAmount(val){
    var tot_price= val*150;
    var divobj= document.getElementById("amount");
    divobj.value=tot_price;
}

document.getElementById("bookform").addEventListener('submit',SubmitForm);
document.getElementById("logoutbuttons").addEventListener('click', I=>{
    firebase.auth().signOut()
.then(() => {
    console.log('Signed Out');
    location.replace("login.html")
})
.catch(e=>{
    console.error('Sign Out Error', e);
});
});

function validate_passengers(){
    pass=document.getElementById("passengers");
    if (pass.value=="1"){
        alert("Please enter correct number of passengers");
    }
}

```

```

        return false;
    }
    return true;
}

```

```
</script>
```

○ CONFIRM PAGE

```

<h2>BOOKING CONFIRMATION</h2><br></div>
<div class=result-box>
    <div class=containerox>
        <h6 id=resultname> NAME: <span id=result-name></span></h6>
        <h6 id=resultemailid> EMAIL-ID: <span id=result-emailid></span></h6>
        <h6 id=resultcontactno> CONTACT NUMBER: <span id=result-
contactno></span></h6>
        <h6 id=resultpassengers> NUMBER OF PASSENGERS: <span id=result-
passengers></span></h6>
        <h6 id=resultforests> SAFARI FOREST: <span id=result-
forests></span></h6>
        <h6 id=resultdate> DATE: <span id=result-date></span></h6>
        <h6 id=resultslot> SLOT: <span id=result-slot></span></h6>
        <h6 id=resultvehicle> VEHICLE: <span id=result-vehicle></span></h6>
        <h6 id=resultamount>AMOUNT: <span id=result-amount></span></h6>
        <button id=buttonconf onclick=paymentprocess()>PROCEED</button>

</div></div>

<script src=https://cdnjs.cloudflare.com/ajax/libs/firebase/7.14.1-
0/firebase.js></script>
<script src=../static/js/home.js></script>
<script src=../static/js/book.js> </script>
<script src=../static/js/payment.js></script>
<script src=https://checkout.razorpay.com/v1/checkout.js></script>
<script>
    document.getElementById(result-
name).innerHTML=localStorage.getItem(NAME);
    document.getElementById(result-
passengers).innerHTML=localStorage.getItem(PASSENGERS);
    document.getElementById(result-
slot).innerHTML=localStorage.getItem(SLOTS);
    document.getElementById(result-
emailid).innerHTML=localStorage.getItem(EMAIL);
    document.getElementById(result-
contactno).innerHTML=localStorage.getItem(CONTACT);
    document.getElementById(result-
forests).innerHTML=localStorage.getItem(FORESTS);

```

```
        document.getElementById("result-  
date").innerHTML=localStorage.getItem("DATE");  
        document.getElementById("result-  
vehicle").innerHTML=localStorage.getItem("VEHICLE");  
        document.getElementById("result-  
amount").innerHTML=localStorage.getItem("AMOUNT");  
  
        document.getElementById("logoutbuttons").addEventListener('click', (e)=>{  
            firebase.auth().signOut()  
            .then(() => {  
                console.log('Signed Out');  
                location.replace("login.html")  
            })  
            .catch(e=>{  
                console.error('Sign Out Error', e);  
            });  
        })
```


○ DATASET

Area,Oxygen,Temperature,Humidity,Fire Occurrence

Jharkand,40,45,20,1

Mumbai,50,30,10,1

Amarnath,10,20,70,0

Nagpur,60,45,70,1

Daltonganj,30,48,10,1

Uttarakhand,50,15,30,0

Delhi,5,35,35,0

Agra,5,20,70,0

Lucknow,60,32,19,1

Rentachintala,30,50,45,1

Phalodi,40,55,80,1

Chandrapur,30,39,100,0

Mukteswar,10,12,12,0

Dehradun,20,23,23,0

Agra,60,34,15,1

Srinagar,80,4,68,0

Sri Ganganagar,25,56,79,1

Bilaspur,12,45,90,0

Titlagard,28,43,15,1

Rohtang Pass,26,0,32,0

Vadodara,32,37,21,1

Titlagarh,45,48,12,1

Kohima,56,15,65,0

Delhi,67,45,33,1

Agra,78,49,8,1

Barmer,89,45,18,1

Shillong,21,12,44,0

Raipur,11,20,59,0

Kolkata,1,32,70,0

Srinagar,5,20,45,0

Chandrapur,42,43,20,1

Jhaansi,32,60,30,1

Amritsar,5,15,5,0

Ludhiana,20,30,5,0

Patna,30,51,2,1

5.3 TESTING APPROACH

5.3.1 UNIT TESTING

A unit is the smallest testable part of any software. It usually has one or a few inputs and usually a single output. It is a testing technique using which individual modules are tested to determine if there are any issues by the developer himself. It is concerned with the functional correctness of the standalone modules. Unit Testing helps to verify the internal design and internal logic as well as error handling of modules.

Types of Unit Testing:

- Manual

Manual testing is time-consuming due to running test cases as everything is done manually.

- Automated

Automated testing is much faster than manual testing due to using the software.

How did I implement Unit Testing?

I checked each input section by entering details and validating it.

5.3.2 INTEGRATED TESTING

Unit testing uses modules for testing purpose, and these modules are combined and tested in integration testing. The Software is developed with several software modules that are coded by different coders or programmers. The goal of integration testing is to check the correctness of communication among all the modules i.e., to verify the functional, performance, and reliability between the modules that are integrated. Integration Testing is the second level of testing performed after Unit Testing and before System Testing.

Types of Integration Testing:

- Big-Bang

In this all the modules of the system are simply put together and tested. This approach is practicable only for very small systems.

- Bottom-Up

In bottom-up testing, each module at lower levels is tested with higher modules until all modules are tested. The primary purpose of this integration testing is to test the interfaces among various modules making up the subsystem.

- Top-Down

Top-down integration testing technique used to simulate the behaviour of the lower-level modules that are not yet integrated. In this integration

testing, testing takes place from top to bottom. First high-level modules are tested and then low-level modules and finally integrating the low-level modules to a high level to ensure the system is working as intended.

- **Mixed**

A mixed integration testing is also called sandwiched integration testing. A mixed integration testing follows a combination of top down and bottom-up testing approaches. In top-down approach, testing can start only after the top-level module have been coded and unit tested. In bottom-up approach, testing can start only after the bottom level modules are ready. This sandwich or mixed approach overcomes this shortcoming of the top-down and bottom-up approaches.

How did I implement Integrated Testing?

I checked if the module works together with other modules without generating crashes.

5.4 MODIFICATIONS AND IMPROVEMENTS

Within the given time limit I were able to overcome several problem causing modules. The designs were changed for some functions for providing better interface to user. Few other changes regarding my choice of login and signup were updated. Some integration failure modules were also replaced.

5.5 TEST CASES

The screenshot displays the 'FOREST FIRE PREDICTION' website. The top navigation bar includes links for HOME, ABOUT US, PREVENTIVE MEASURES, NEWS, EVENTS, ONLINE SAFARI BOOKING, and CONTACT US. A banner reads 'HAVE A LOOK BELOW ON HOW TO USE THE WEBSITE!!'. Below this is a framed preview of the data entry form. The form itself has a yellow header and a green 'ENTER YOUR DATA' title. It contains three input fields: TEMPERATURE (with value 10), OXYGEN (with value 10), and HUMIDITY (with value 45). A green 'PREDICT' button is positioned below these fields. A red arrow points from the 'PREDICT' button to a text box that reads: 'Here, the temperature and oxygen level in a particular area is low and the humidity level is high. Therefore the probability of fire occurring in the forest area is very low.' Below the text box is a green 'CHECK YOUR CITY DATA HERE!' button. The bottom of the preview shows the output: 'YOUR FOREST IS SAFE. PROBABILITY OF FIRE OCCURRING IS 0.02 (ON THE SCALE OF 0-1)'. Below the preview, the actual data entry form is shown with empty input boxes for TEMPERATURE, OXYGEN, and HUMIDITY, and a green 'PREDICT' button. Below the button is the text '(ON THE SCALE OF 0-1)' and 'CHECK YOUR CITY DATA HERE!'. The footer of the page reads '©2022 FOREST FIRE PREDICTION A Project By Aysha Qureshi'.

HOME PAGE INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that no texts are entered in the Numbers input box.	None should be entered and displayed.	None are entered and displayed.	PASS
2.	Verify that the numbers entered in the input boxes must be only integers.	No float numbers should be accepted, only integers.	No float numbers are accepted, only integers.	PASS

3.	Verify that the Temperature input box only accepts values less than 90.	No numbers greater than 90 should be accepted.	No numbers greater than 90 are accepted.	PASS
4.	Verify that the Humidity input box only accepts values less than 90.	No numbers greater than 90 should be accepted.	No numbers greater than 90 are accepted.	PASS
5.	Verify that the Oxygen input box only accepts values less than 90.	No numbers greater than 90 should be accepted.	No numbers greater than 90 are accepted.	PASS
6.	Verify that the button when clicked displays the prediction output.	When clicked, it should display the output.	When clicked, it displays the output.	PASS
7.	Verify the range of the output displayed.	The range of the output should be within 0-1.	The range of the output should be within 0-1.	PASS
8.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS



ABOUT US INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that the images keep changing as aligned.	The images should change.	The images are changing as expected.	PASS
2.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS



PREVENTIVE MEASURES INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that the images keep changing as aligned.	The images should change.	The images are changing as expected.	PASS
2.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS



NEWS INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that all the images fit the box.	The images should be in the box with the paragraph.	The images are in the box with the paragraph.	PASS
2.	Verify that the boxes are placed with equal spacings.	The boxes should be aligned and placed with equal spacings.	The boxes are aligned and placed with equal spacings.	PASS
3.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS



EVENTS INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that all the images fit the box.	The images should be in the box with the paragraph.	The images are in the box with the paragraph.	PASS
2.	Verify that the boxes are placed with equal spacings.	The boxes should be aligned and placed with equal spacings.	The boxes are aligned and placed with equal spacings.	PASS
3.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS



ONLINE SAFARI BOOKING INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that all the images fit the box.	The images should be in the box with the paragraph.	The images are in the box with the paragraph.	PASS
2.	Verify that the boxes are placed with equal spacings.	The boxes should be aligned and placed with equal spacings.	The boxes are aligned and placed with equal spacings.	PASS
3.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS
4.	Verify that the images keep changing as aligned.	The images should change.	The images are changing as expected.	PASS



TARIFF DETAILS INTERFACE

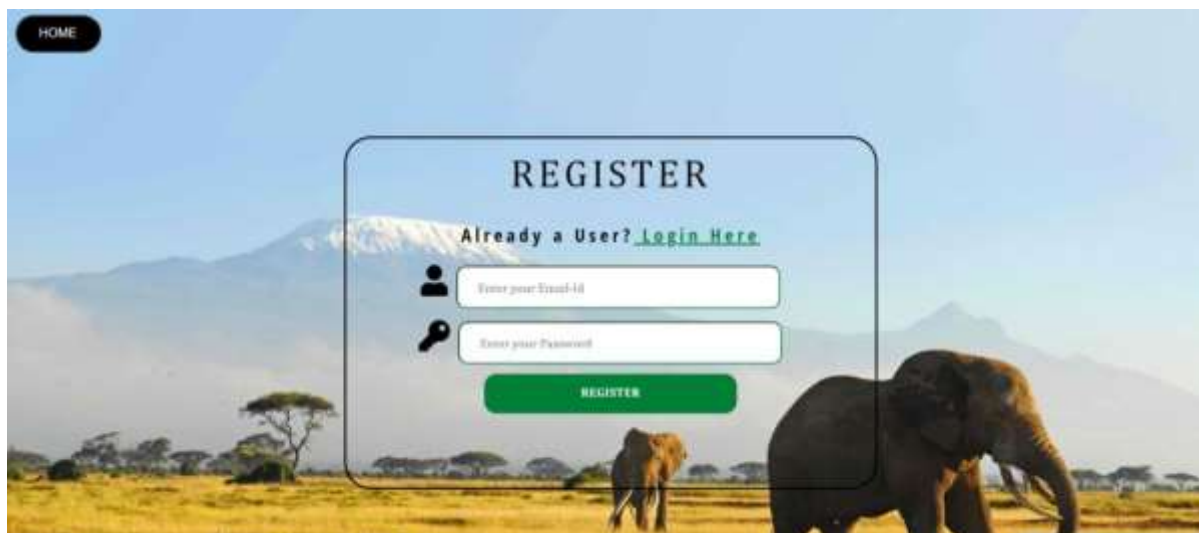
Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that the image fits the box.	The image should be in the box with the paragraph.	The image is in the box with the paragraph.	PASS



LOGIN INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that incorrect email format is not accepted.	Email should be accepted only in proper format.	Email is accepted in proper and correct format.	PASS
2.	Verify the email authentication performed with firebase.	<p>If email is registered and then the same email is used for login, then the email should be accepted by the database.</p> <p>If email is not registered and then the email is used for login, then the email should not be accepted by the database.</p>	<p>Email is accepted by the database.</p> <p>Email is not accepted by the database.</p>	PASS
3.	Verify the password entered in the password input field.	The password entered in the input box should be more than 6 characters to be accepted.	The password entered in the input box is accepted when it is more than 6 characters.	PASS

		The password entered in the input box should not be accepted when it is less than 6 characters.	The password entered in the input box is not accepted when it is less than 6 characters.	
4.	Verify that the login details of the user are stored correctly.	The user login details should be stored in the database.	The user login details are stored in the database.	PASS
5.	Verify that the password is not stored in the database with the login details of the user.	The password should not be stored in the database.	The password is not stored in the database.	PASS
6.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS
7.	Verify that the button functions correctly.	The button, when clicked should redirect to the bookings page after entering valid details.	The button, when clicked is redirected to the bookings page after entering valid details.	PASS



REGISTRATION INTERFCAE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that incorrect email format is not accepted.	Email should be accepted only in proper format.	Email is accepted in proper and correct format.	PASS
2.	Verify the email authentication performed with firebase.	<p>If email is registered and then the same email is used for login, then the email should be accepted by the database.</p> <p>If email is not registered and then the email is used for login, then the email should not be accepted by the database.</p>	<p>Email is accepted by the database.</p> <p>Email is not accepted by the database.</p>	PASS
3.	Verify the password entered in the password input field.	The password entered in the input box should be more than 6 characters to be accepted.	The password entered in the input box is accepted when it	PASS

		The password entered in the input box should not be accepted when it is less than 6 characters.	is more than 6 characters. The password entered in the input box is not accepted when it is less than 6 characters.	
4.	Verify that the login details of the user are stored correctly.	The user login details should be stored in the database.	The user login details are stored in the database.	PASS
5.	Verify that the links are opened to the correct page.	The links should display the correct page.	The links display the correct page.	PASS
6.	Verify that the button functions correctly.	The button, when clicked should redirect to the bookings page after entering valid details.	The button, when clicked is redirected to the bookings page after entering valid details.	PASS

The screenshot shows a web application titled "ONLINE SAFARI BOOKINGS". The navigation bar includes links for "FOREST FIRE PREDICTION", "SAFARI DETAILS", "BOOK NOW", "SAFARI TIMINGS", and "CONTACT US". A "LOGOUT" button is also present. Below the navigation bar, there is a prominent "BOOK NOW" button. The main content area displays a form for booking a safari. The form fields are: "Enter your name", "Enter your Email-Id", "Enter your Phone number", a date selector (currently showing "1" and "dd-mm-yyyy"), a time selector (currently showing "Morning 9am-1pm"), a vehicle type selector (currently showing "Mini Bus"), a location selector (currently showing "Sanjay Gandhi"), and an "Amount" field. A "SUBMIT" button is located at the bottom of the form.

BOOK NOW INTERFACE

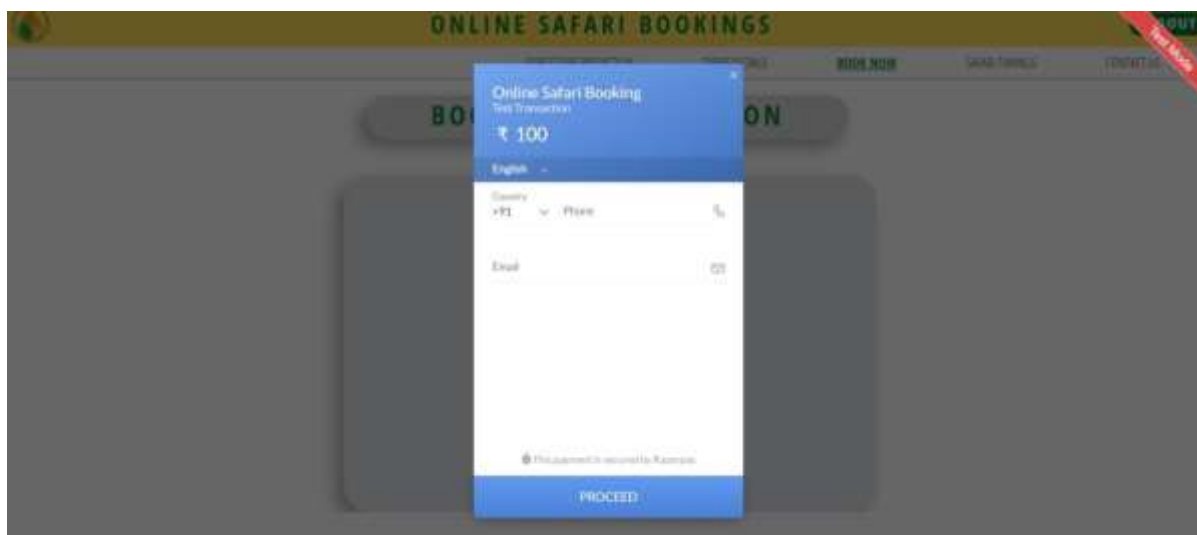
Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that no numbers are accepted in the Character/String input field.	No numbers should be accepted.	No numbers are accepted.	PASS
2.	Verify that incorrect email format is not accepted.	Email should be accepted only in proper format.	Email is accepted in proper and correct format.	PASS
3.	Verify that no texts are accepted in the number input field.	No text should be accepted.	No text is accepted.	PASS
4.	Verify that the button functions properly.	The button when clicked should send the data to the database.	The button when clicked is sending the data to the database.	PASS
5.	Verify that the button functions properly.	The button, when clicked, should redirect to the next page.	The button, when clicked, should redirect to the next page.	PASS
6.	Verify that the amount input field is only readable.	The amount input field	The amount input field is readable.	PASS

		should only be readable.		
7.	Verify that date input works correctly.	The date input should take a date ahead of the present day.	The date input is taking a date ahead of the present day.	PASS



CONFIRM BOOKING INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that the data is correct when fetched from the console.	The data should be correct.	The data is correct.	PASS
2.	Verify that the boxes are placed with equal spacings.	The boxes should be aligned and placed with equal spacings.	The boxes are aligned and placed with equal spacings.	PASS
3.	Verify that the button functions properly.	When clicked, the button should open the payment gateway.	When clicked, the button is opening the payment gateway.	PASS



PAYMENT INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that the transaction is done correctly with any of the methods.	The transaction should be done correctly only when the input fields entered are correct.	The transaction is done correctly only when the input fields entered are correct.	PASS
2.	Verify that the transaction details are entered in the database.	The transaction details should be logged in the database (razor-pay dashboard)	The transaction details are logged in the database (razor-pay dashboard)	PASS

CONTACT US INTERFACE

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that no numbers are accepted in the Name input field.	No numbers should be accepted.	No numbers are accepted.	PASS
2.	Verify that no numbers are accepted in the Question input field.	No numbers should be accepted.	No numbers are accepted.	PASS
3.	Verify that incorrect email format is not accepted.	Email should be accepted only in proper format.	Email is accepted in proper and correct format.	PASS
4.	Verify that the button functions properly.	The button when clicked should send the data to the database.	The button when clicked is sending the data to the database.	PASS
5.	Verify that the button functions properly.	The button, when clicked, should alert the user with a message.	The button, when clicked, alerts the user with a message.	PASS

SUBSCRIPTION

Sr. No	Test Case	Expected Output	Achieved Output	Remark
1.	Verify that no numbers are accepted in the Name input field.	No numbers should be accepted.	No numbers are accepted.	PASS
2.	Verify that incorrect email format is not accepted.	Email should be accepted only in proper format.	Email is accepted in proper and correct format.	PASS
3.	Verify that the button functions properly.	The button when clicked should send the data to the database.	The button when clicked is sending the data to the database.	PASS
4.	Verify that the button functions properly.	The button, when clicked, should alert the user with a message.	The button, when clicked, alerts the user with a message.	PASS

CHAPTER 6

RESULTS AND DISCUSSION

6.1 TEST REPORTS

Pages	Test cases planned	Test cases executed	Test cases passed	Test cases failed
Home page (Prediction)	8	8	8	0
About Us	2	2	2	0
Preventive Measures	2	2	2	0
News	3	3	3	0
Events	3	3	3	0
Safari Booking	4	4	4	0
Tariff Details	1	1	1	0
Login	7	7	7	0
Registration	6	6	6	0
Book now	7	7	7	0
Confirm booking	3	3	3	0
Payment	2	2	2	0
Contact Us	9	9	9	0

CHAPTER 7

CONCLUSION

7.1 CONCLUSION

I hereby conclude my documentation for semester VI, while I have learned from the research, analysis and implementation of my documentation and project a lot of things. The research has taken me through a lot of analysis on many machine learning models and algorithms, python programming languages and many libraries related to it.

This project has also driven me on doing a lot of research on which database to use for my backend, using which server to deploy and many more.

While preparing for the documentation in the semester V, I have developed a wireframe as well as the User Interface design which gave me an overview of how my design would be.

Further, In the semester VI, where there was more about implementing the project, I learned and face a lot of errors and issues which helped me get through various more errors in the further improvement of my project. There were various errors which occurred again and again, and then I had to solve it again and again. From this I gained the practical experience and understood the concept and the difference between Relational Databases and NoSQL databases.

My main aim to make this project was to predict the forest fire from taking place in any particular region, I came up with an instant idea when there was a rigorous fire in Australia, Turkey, Russia, Siberia, Amazon in the span of 2019-2021. There was a huge loss of the flora and fauna in these years, we lost many endangered species.

In this project, the accuracy of the model is 86.7%. The chances of predicting the forest fire wrongly or giving a wrong output is 20% while predicting the right output is 80%.

7.1.1 SIGNIFICANCE OF THE SYSTEM

Forest fire website allows the user to integrate the inputs with their correct values or maybe incorrect, mostly it doesn't matter, because the output will be upon the accuracy of the model. The main issue covered in this project is predicting a wildfire that is or is not going to happen at a given area, which will give us sufficient time to collect resources and visit the area and save the forest. I have

developed a two-stage methodology which requires some input parameters like humidity, temperature and oxygen of an area and then the output will be whether there is a chance of the fire taking place or not. The prediction must be provided as fast as possible to be useful, thus it is necessary to exploit all available computing resources and therefore my idea is to develop and work on an algorithm that'll have enough accuracy. The user can book online safari through a Book now page with online payments by logging or registering on the website.

7.2 LIMITATIONS OF THE SYSTEM

- The accuracy of emotion detection is 86.7%, this can be overcome in future using better and fruitful dataset and increasing the number of parameters.
- Admin panel is required to manage the whole backend.
- More parameters are needed to predict the accurate wildfires.
- Eliminating the static payment method while booking an online safari.
- Adding more safari forests to the scope.

7.3 FUTURE SCOPE OF THE PROJECT

In this short span, I was able to cover only the parts mentioned in the documentation while I was planning to add more features to this website. Firstly, a machine learning model learns by itself through out the process of predicting, testing and learning, but there are quite modifications required to do for my model.

The website can be deployed after doing some modifications and again after the modifications the testing part comes, then the website can be actually used by users all over the world. I have been planning to deploy this website with Flask or Heroku app but since there are some ideas in my mind first, I will have to improve my website project first and then deploy the website.

As the scope of this website will increase in the future, I will try to increase the number of forest safaris within the bookings section to attract more users on the website.

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