"WEATHER FORECASTING "

A

Project Report

submitted

in partial fulfillment

for the award of the Degree of

Bachelor of Technology

in Department of Information Technology

Project Mentor:
Name: Dr. Sunita Gupta
Designation : Associate Proffesor

Submitted By :
Niharika Goyal(19ESKIT62)
Nayan Gupta(19ESKIT061
Naresh Kumar(19ESKIT60)
Saurabh Nahata(19ESKIT085)

Department of Information Technology
Swami Keshvanand Institute of Technology, M & G, Jaipur
Rajasthan Technical University, Kota
Session 2022-2023

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Department of Information Technology

CERTIFICATE

This is to certify that Ms. Niharika Goyal students of B.Tech(Information Technology) 8th semester has submitted his/her Project Report entitled ”.....” under my guidance.

Mentor

Name- Sunita Gupta

Designation- Associate Professor

Signature.....

Coordinator

Name- Sanju Chaudhary

Designation- Associate Professor

Signature.....

Swami Keshvanand Institute of Technology, Management & Gramothan, Jaipur

Department of Information Technology

CERTIFICATE

This is to certify that Mr. Nayan Gupta students of B.Tech(Information Technology) 8th semester has submitted his/her Project Report entitled ".....” under my guidance.

Mentor

Name- Sunita Gupta

Designation- Associate Professor

Signature.....

Coordinator

Name- Sanju Chaudhary

Designation- Associate Professor

Signature.....

Swami Keshvanand Institute of Technology,

Management & Gramothan, Jaipur

Department of Information Technology

CERTIFICATE

This is to certify that Mr. Saurabh Nahata students of B.Tech(Information Technology) 8th semester has submitted his/her Project Report entitled ".....” under my guidance.

Mentor

Name- Sunita Gupta

Designation- Associate Professor

Signature.....

Coordinator

Name- Sanju Chaudhary

Designation- Associate Professor

Signature.....

Swami Keshvanand Institute of Technology,

Management & Gramothan, Jaipur

Department of Information Technology

CERTIFICATE

This is to certify that Mr. Naresh Jangid students of B.Tech(Information Technology) 8th semester has submitted his/her Project Report entitled "......" under my guidance.

Mentor

Name- Sunita Gupta

Designation- Associate Professor

Signature.....

Coordinator

Name- Sanju Chaudhary

Designation- Associate Professor

Signature.....

Acknowledgement

A project of such a vast coverage cannot be realized without help from numerous sources and people in the organization.We take this opportunity to express our gratitude to all those who have been helping us in making this project successful.

We are highly indebted to our faculty mentor Mrs. Sunita Gupta. She has been a guide, motivator source of inspiration for us to carry out the necessary proceedings for the project to be completed successfully. We also thank our project coordinator Mrs. Sanju Choudhary for her co-operation, encouragement, valuable suggestions and critical remarks that galvanized our efforts in the right direction.

We would also like to convey our sincere thanks to Prof.Dr.Anil Choudhary, HOD, Department of Information Technology, for facilitating, motivating and supporting us during each phase of development of the project. Also, we pay our sincere grat- itude to all the Faculty Members of Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur and all our Colleagues for their co-operation and support.

Last but not least we would like to thank all those who have directly or indirectly helped and cooperated in accomplishing this project.

(Niharika Goyal,19ESKIT062)
(Nayan Gupta, 19ESKIT061)
(Saurabh Nahata, 19ESKIT085)
(Naresh Kumar, 19ESKIT060)

DECLARATION

We hereby declare that the report of the project entitled "Wether Forecating system" is a record of an original work done by us at Swami Keshvanand Institute of Technology, Management and Gramothan, Jaipur under the mentorship of "...."(Dept. of Information Technology) and coordination of "....." (Dept.of Information Technology). This project report has been submitted as the proof of original work for the partial fulfillment of the requirement for the award of the degree of Bachelor of Technology (B.Tech) in the Department of Computer Science and Technology.It has not been submitted anywhere else, under any other program to the best of our knowledge and belief.

Team Members **Signature**

(Niharika Goyal,)Team Member1

(Nayan Gupta)Team Member2

(Naresh Kumar) Team Member3

(Saurabh Nahata) Team Member3

Contents

List of Figures

Chapter 1

INTRODUCTION

1.1 Problem Statement and Objective

Air pollution is a major problem in many parts of the world, and it can have a significant impact on human health. Poor air quality can cause respiratory problems, heart disease, and cancer. It can also lead to premature death. Weather can also have a significant impact on air quality. For example, stagnant air can trap pollutants, leading to poor air quality. Wind can also help to disperse pollutants, leading to improved air quality. The objective of a weather forecasting and air quality monitoring system is to provide information about air quality and weather conditions. This information can be used to help people protect their health from the effects of air pollution.The system would collect data from a variety of sources, including air quality monitoring stations, weather stations, and satellite data. The data would be used to generate forecasts of air quality and weather conditions.The system would also provide information about the health risks associated with different levels of air pollution. This information would be used to help people make informed decisions about their health and safety.The system would be designed to be user-friendly and accessible to everyone. It would be available online and through mobile devices.

1.2 Literature Survey /Market Survey/Investigation and Analysis.

Weather forecasts enable effective planning and preparation for severe weather events, supporting disaster management efforts and safeguarding lives and property. Transportation and aviation industries rely on accurate weather predictions to optimize operations, ensure passenger safety, and minimize disruptions. In agriculture, weather forecasts assist farmers in making informed decisions about planting, irrigation, and pest control, optimizing crop yields and resource utilization.

1.3 Introduction to Project

Weather forecasting and air quality monitoring systems are becoming increasingly important as the world becomes more urbanized and the effects of climate change become more evident. These systems can help us to protect our health, property, and environment. The data from these APIs will be used to generate weather forecasts and air quality reports. The website will also provide users with alerts and advisories about potential weather hazards and air quality problems. The website will be developed using open source software and hardware. This will make it affordable and accessible to a wide range of users.

1.4 Proposed Logic / Algorithm / Business Plan / Solution

The website will utilize APIs to fetch real-time weather forecasts and air quality data. Users will have access to a user-friendly interface where they can input their desired location or use geolocation. The system will interact with the APIs to retrieve relevant data such as temperature, precipitation, wind

speed, humidity, and air quality indicators. The fetched data will be processed and presented using interactive maps, charts, and graphs for easy visualization. Customization options, real-time updates, and alerts for severe weather conditions and hazardous air quality levels will enhance the user experience. The website will also provide documentation, support, and ensure mobile responsiveness for convenient access across devices. Overall, the website will empower users with accurate and timely information for informed decision-making.

1.5 Scope of the Project

The scope of the project includes developing a website that utilizes APIs to fetch real-time weather forecasts and air quality data. The website will have a user-friendly interface with features such as location-based data retrieval, data processing, and visualization. It will provide customization options, real-time updates, and alerts for severe weather conditions and hazardous air quality levels. The project scope also includes ensuring mobile responsiveness, documentation, and support for users. The primary goal is to deliver accurate and timely weather and air quality information to empower users in making informed decisions.

Chapter 2

Software Requirement Specification

2.1 Overall Description

Visual analytics tools allow consumers to understand the relationship between variables easily and make better profitable decisions. The fields of information and scientific visualization deal with visual representations of data. The main difference among the two is that scientific visualization examines potentially huge amounts of scientific data obtained from sensors, simulations or laboratory tests

2.2 Product Perspective

2.2.1 User Interfaces:- We have tried to keep the User interface as simple as possible so that users can use the application without putting much of their efforts. Like any other Weather forecasting and Air quality website. In this application user can just hop on to the site and check weather and air quality. 2.2.2 Hardware Interfaces:- For the hardware requirements, the SRS specifies the logical charac- teristics of each interface b/w the software product and the hardware components. It specifies the hardware requirements like memory restriction, cache size, processor, RAM etc. those are required for soft- ware to run.

2.3 Minimum Hardware Requirements

Hard Disk: 20GB and Above

RAM: 512MB and Above

Processor: Pentium III and Above

2.4 Software Interfaces

1. For Hosting - Any Windows Operations System with DOS Sup- port and Virtual Studio for development. Primarily Windows 8 having Dream Weaver Installed with a working LAN connection to mandatory.
2. For Using - Any type of operating system with a Least Inter- net Explorer Installed and having minimum of 521 kbps working LAN compulsorily.
3. Web Server - Operating System (Windows)

2.5 Operations

This software will work on all operating systems with a web browser with active internet connection.

2.6 Project Functions

The website will utilize APIs to fetch real-time weather forecasts and air quality data. It will provide functions such as location-based data retrieval, data processing, and visualization through interactive maps and charts. Users will have customization options, receive real-time updates, and alerts for severe weather conditions and hazardous air quality levels. The website will prioritize mobile responsiveness and provide documentation and support for users. The primary function is to deliver accurate and timely weather and air quality information for informed decision-making.

2.7 Constraints

• GUI is only in English.

• Limited to HTTP/HTTPS or locally during development.This system is working for a single server.

2.8 Assumption and Dependencies

The success of this system depends on

1. Existence of an Internet service.

2. Admins (retailers) and Users (customers) must be comfortable with computers and have enough ability to work with the prod- uct. Website interface must be friendly and easy-to-use.

Chapter 3

System Design Specification

3.1 System Architecture And High Level Design Diagrams

This document presents the architecture as a series of views; use case view, logical view, process view and deployment view. There is no separate implementation view described in this document. These are views on an underlying Unified Modeling Language (UML) model developed using Rational Rose.

3.2 Use Case Diagram

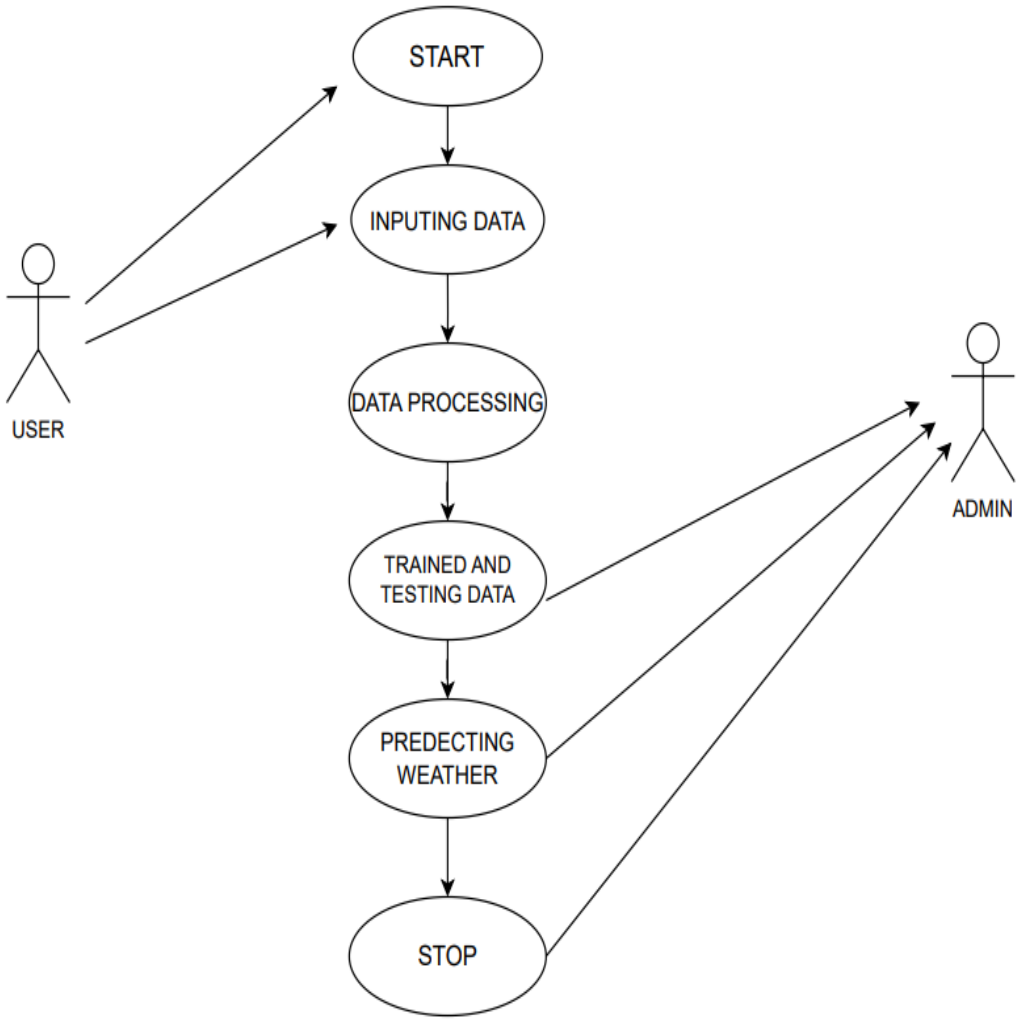

Figure 3.1: Use Case Daigram

3.3 Sequence Diagram

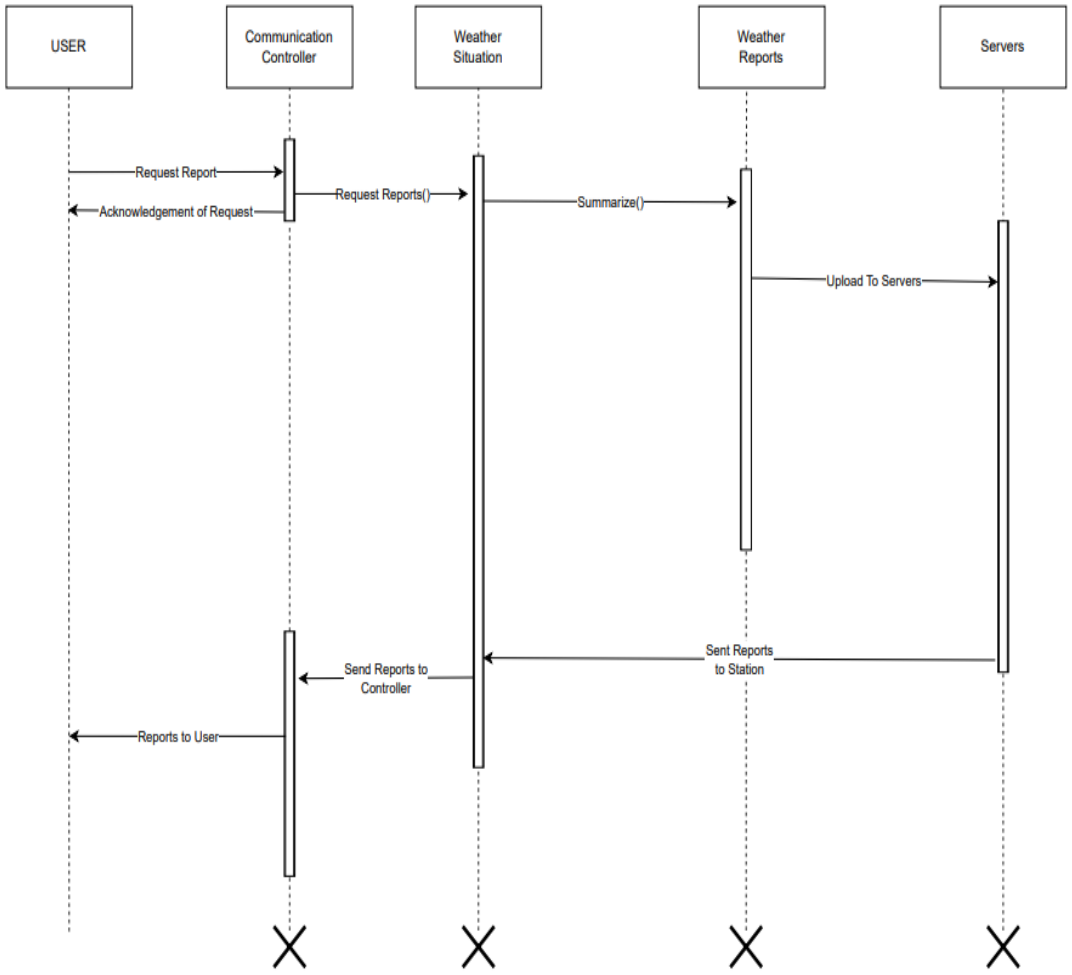

Figure 3.2: sequence Daigram

3.4 ER Diagram

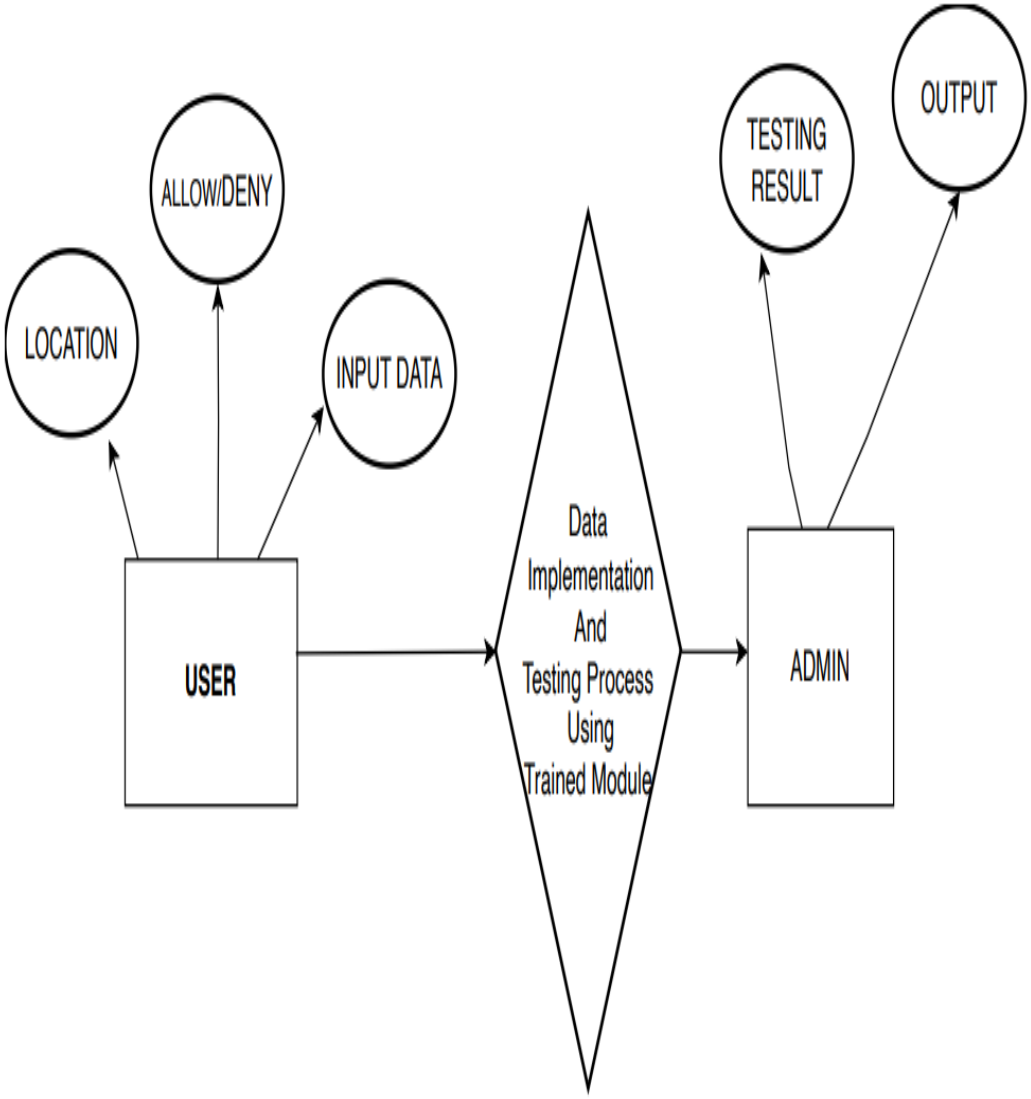

Figure 3.3: ER Daigram

Chapter 4

Methodology and Team

4.1 Methodology

The methodology for developing the weather forecasting and air quality monitoring system website involves a systematic approach to ensure the successful implementation of the project. The following steps outline the methodology:
1.Requirement Analysis: This step involves identifying and understanding the requirements of the weather forecasting and air quality monitoring system website. It includes gathering information about the desired features, functionality, and user expectations.
2. API Selection: The next step is to select suitable APIs for retrieving weather forecasts and air quality data. This involves researching and evaluating various APIs based on factors such as data accuracy, reliability, availability, and compatibility with the project requirements.
3. Website Design and Development: Once the requirements and APIs are finalized, the website design and development process begins. This includes creating an intuitive user interface, designing interactive maps, charts, and graphs for data visualization, and implementing the necessary functionalities for data retrieval and processing.
4. API Integration: The selected APIs are integrated into the website to fetch real-time weather forecasts and air quality data. API calls are made to retrieve the relevant data based on user inputs or geolocation information.
5. Data Processing and Visualization: The fetched data is processed and analyzed to extract the required information. Algorithms and techniques are

implemented to convert raw data into meaningful insights. Interactive visualizations such as maps, charts, and graphs are created to present the data in a user-friendly and understandable format.

6. Customization Options: The website provides customization options to allow users to personalize their preferences. This includes features like selecting temperature units, setting air quality thresholds, and enabling notifications for specific weather conditions or air quality levels.

7. Testing and Quality Assurance: Rigorous testing is conducted to ensure the website's functionality, performance, and accuracy. Test cases are designed and executed to validate features, API integration, data processing, and customization options. Any issues or bugs identified during testing are addressed and resolved.

4.2 Team Members, Roles Responsibilities

1. Nayan Gupta – He maintained front end of the system. Created the front-end for the User in HTML and CSS.

2. Niharika Goyal - Developed the back-end of the system. She done all work of java script in project.

3. Naresh Jangid – He add API in the project and test the whole project and find bugs.

4. Saurabh Nahata – He add API in the project and create the required document for the project

Chapter 5

Centering System Testing

In a weather forecasting site, various types of testing are performed to ensure the accuracy and reliability of the weather information provided. Some common types of testing conducted in weather forecasting sites include:

Functional Testing: This involves testing the functionality of the website, such as verifying that weather data is displayed correctly, navigation is working, search functionality is functioning properly, and interactive features (like maps and charts) are working as expected.

Data Accuracy Testing: Weather forecasting heavily relies on accurate data. This type of testing involves validating the accuracy of the weather data being received and displayed on the site. It may involve comparing the forecasts with actual weather conditions for a given period, analyzing historical data, and verifying the accuracy of various meteorological parameters.

Performance Testing: Weather forecasting sites often handle a large amount of traffic, especially during severe weather events. Performance testing helps determine how the site performs under different load conditions, ensuring it can handle the expected user traffic and deliver timely information without performance degradation or crashes.

Usability Testing: Usability testing focuses on evaluating the user experience of the website. It involves assessing the site's ease of navigation, clarity of information, intuitiveness of user interface elements, and overall user satisfaction. Feedback from users or potential users is collected to identify areas for improvement and enhance the usability of the site.

Cross-Browser and Cross-Device Testing: Weather forecasting sites need

to be accessible and functional across different web browsers (e.g., Chrome, Firefox, Safari) and devices (e.g., desktop, mobile, tablets). Cross-browser and cross-device testing ensures consistent performance and user experience across various platforms.

Geolocation Testing: Since weather forecasts are location-specific, geolocation testing is crucial. It involves verifying that the site accurately determines the user's location or allows users to input their location for personalized weather information. This testing ensures the site can retrieve and display accurate forecasts for different geographical areas.

Security Testing: Weather forecasting sites may handle sensitive user information and need to protect against security vulnerabilities. Security testing involves identifying potential security risks, such as data breaches, unauthorized access, and vulnerabilities in the website's infrastructure. It aims to ensure the site follows best practices for secure data transmission and storage.

Integration Testing: Weather forecasting sites often integrate with various data sources and APIs to gather weather information. Integration testing verifies the proper functioning and compatibility of these integrations, ensuring accurate data retrieval and smooth communication between the website and external systems.

These are some of the common types of testing conducted in weather forecasting sites. The specific testing approach may vary depending on the site's complexity, requirements, and the technologies used.

Chapter 6

Test Execution Summary

The weather forecast website was tested thoroughly to ensure its functionality, performance, and accuracy. The testing process included various aspects such as usability, compatibility, security, and reliability. They observe the system's behavior, validate the outputs, and compare them against the expected results. Testers also log any defects.The objective was to identify any issues or bugs that could affect the user experience or the reliability of the forecast data. Here is a summary of the test execution and its results:

Test Scope:

The test scope covered the following areas of the weather forecast website:

1. User Interface: Testing the website's interface for ease of use, responsiveness, and consistency across different devices and browsers.

2. Forecast Accuracy: Verifying the accuracy of the weather forecast data by comparing it with real-time weather conditions.Passed Test Cases

3. Search Functionality: Testing the search feature to ensure it retrieves accurate and relevant weather information for specified locations.

4. Performance: Assessing the website's performance under various load conditions to ensure quick response times and minimal downtime.

Test Results:

1. User Interface: The website's user interface was found to be intuitive and visually appealing. It displayed correctly across different devices and browsers, providing a consistent user experience.

2. Forecast Accuracy: The weather forecast data showed a high level of accuracy when compared with real-time weather conditions. The predictions aligned closely with the actual weather, indicating reliable forecasting algorithms.

3. Search Functionality: The search feature performed well, delivering accurate weather information for specified locations. It displayed relevant results promptly, making it easy for users to find the desired forecasts.

4. Performance: The website exhibited good performance under various load conditions. It responded quickly to user requests, and there were no significant performance issues or downtime observed during testing.

Chapter 7

Project Summary and Conclusions

7.1 Conclusion

In conclusion, the development and implementation of a weather forecasting and air quality monitoring system website using APIs have significant implications for various sectors and stakeholders. This project report has highlighted the importance and benefits of such a system in providing accurate and timely weather forecasts, as well as real-time air quality information. By leveraging APIs and integrating data from reliable sources, users can access critical information for making informed decisions related to public safety, transportation, agriculture, renewable energy, outdoor activities, and health. The website's functions, including location-based data retrieval, data processing, visualization, customization options, and real-time updates, contribute to an enhanced user experience and empower individuals to plan and adapt to changing weather conditions and air quality levels. The future scope of these systems, with advancements in technology such as AI, big data analytics, IoT integration, and personalized forecasting, promises even greater accuracy and precision, as well as opportunities for urban planning, climate change adaptation, and smart city integration. By facilitating collaboration, data sharing, and leveraging emerging technologies, weather forecasting and air quality monitoring system websites can contribute to better public health outcomes, resource management, and sustainable practices.

7.2 Project Summary

The project focused on developing a weather forecasting and air quality monitoring system website that utilized APIs to retrieve real-time data. The website aimed to provide users with accurate weather forecasts and air quality information for informed decision-making. The project incorporated various features, including location-based data retrieval, data processing, and visualization through interactive maps and charts. Customization options allowed users to personalize their preferences, while real-time updates and alerts ensured they were informed about severe weather conditions and hazardous air quality levels. The website prioritized mobile responsiveness and provided documentation and support for users' convenience. The project's primary objective was to deliver reliable and timely weather and air quality data to empower users across sectors such as public safety, transportation, agriculture, renewable energy, and health

Chapter 8

Project Screen Shots

Figure 8.1: Output(1)

Figure 8.2: Output(1.1)

Figure 8.3: Output(2)

Figure 8.4: Output(2.1)

Chapter 9

Future Scope

The future scope of weather forecasting and air quality monitoring system websites holds immense potential for further advancements and enhancements. The integration of emerging technologies such as artificial intelligence (AI), machine learning, and big data analytics can significantly improve the accuracy and precision of weather forecasts and air quality assessments. These technologies can analyze vast amounts of data from multiple sources, including satellite imagery, weather models, and real-time sensor data, enabling more precise predictions and actionable insights. Additionally, the future of weather forecasting and air quality monitoring websites involves personalized forecasting and hyperlocal data. Users may receive customized forecasts and real-time air quality updates tailored to their specific location and preferences. This personalized approach enhances user experience and empowers individuals to make informed decisions based on localized weather and air quality conditions.

References

[1] https://www.w3schools.com/html/

[2] https://www.w3schools.com/css/

[3] https://opencagedata.com/api

[4] https://home.openweathermap.org/

[5] https://www.w3schools.com/js/