WEATHER FORECASTING

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ABSTRACT— It has always been a difficult task to find a location specific high quality past and near future data for a building community while performing the research or predicting the weather control. In this study, we provide a unique approach: the usage of a weather generator as a weather API. The benefits of this approach are illustrated with a few examples of applications. In conclusion, a weather API makes it easier to integrate models into frameworks, reduces the amount of maintenance needed, and avoids issues with interoperability caused by different computer languages. The data in the Capstone Weather App is shown using the OpenWeatherMap API. Academics and programmers of web-based services and mobile applications may access weather data, including predictions and current analysis data, using the OpenWeatherMap API, an online meteorological service. It might take a lot of effort and money to create and update REST API documentation with use examples for APIs that are continually evolving. Despite the fact that usage examples must be manually entered, several REST API documentation solutions focus on automating API object documentation. By following the suggestions from this paper's REST API documentation, REST API developers may reduce mistakes, boost success rates, and make API client developers happier.

Keywords: Weather data, weather API, Capstone Weather App, OpenWeatherMap API, RESTAPI, meteorological.

1. Introduction

INTRODUCTION

Weather forecasting is the prediction of the state of the atmosphere for a given location using the application of science and technology. This includes temperature, rain, cloudiness, wind speed, and humidity. Weather warnings are a special kind of short-range forecast carried out for the protection of human life

In the world wide the major concern is the climate change, Which has many factors like forest deforestation, Air pollution, Water pollution, Soil pollution etc. The result of climate change comes as a unpredicting weather.

WEATHER FORECASTING IS THE TASK OF CONCERN DEPARTMENT WITH RESPECT TO LOCATION AND TIME. IN case of our state cyclone come very often and we also found the plot very regularly.

weather forecasting has significant implications for public safety and disaster preparedness. Timely and accurate forecasts enable governments, emergency responders, and communities to anticipate and mitigate the impacts of natural disasters such as hurricanes, tornadoes, floods, and wildfires, thereby saving lives and reducing property damage.

Features Weather Forecast Project In Python Django:

- Time to time update weather
- Temperature Update
- Last 7 days data Predict
- change weather in every hours as according to weather changes.
- provide accurate data information about weather.
- user can search weather anytime and anywhere.
- any places data can be search and provide information as according to weather.
- help user to travel.
- help User to future plans for holidays.

1.1 PURPOSE

Every Human subject to adjust themselves with respect to weather conditions for their dressing habits to strategic organizational planning activities, since the adverse weather conditions may cause a considerable damage to lives and properties.

We need to be on alert for these adverse weather conditions by taking some precautions and using prediction mechanisms to detect them and provide early warning of hazardous weather phenomena. Weather prediction is an indispensable requirement for all of us. Weather is important for most aspects of human life. Predicting weather is very useful.

Humans have attempted to make predictions about the weather, many early religions used gods to explain the weather. Only relatively recently have humans developed reasonably accurate weather predictions.

We decided to collect weather data and measured the accuracy of predictions made using linear regression. The Weather prediction model designed by us would be of great use to the farmers and for normal being as well.

This model basically uses historical weather data to predict the weather on a specific day of and year in the future. Initially the aim is to teach the model with large historical data set and then use it for weather prediction. The observations include:

Temperature - the measure of warmth or coldness

Humidity - the amount of moisture in the atmosphere

Precipitation - the amount of moisture (usually rain or snow) which falls on the ground

Wind Speed - the speed at which air flows through the environment

Wind Direction - the direction in which the wind is moving

Pressure - the force the atmosphere applies on the environment

1.2 SCOPE

There is a general and increasing interest on weather information, since every day we habitually give an ear to weather forecast news for local and large-scale longterm or short-term weather predictions. Leading weather research institutions and companies have been developing weather prediction systems capable of detecting, predicting and forecasting weather phenomena and hazards by utilizing state-of-thescience technologies. Thus weather prediction utilization fields and prediction accuracy increases monotonically by the time.

1.3 MOTIVATION

Weather Forecasting is crucial since it helps to determine future climate changes. With the use of latitude, we can determine the probability of snow and hail reaching the surface.

1.4 OVERVIEW

Weather forecasting is the science and art of predicting atmospheric conditions at a specific location and time in the future. It involves analyzing current weather data, understanding atmospheric processes, and using mathematical models to forecast future weather patterns. Weather forecasts provide valuable information about temperature, precipitation, wind, humidity, and other meteorological parameters, helping individuals, businesses, and governments make informed decisions and take appropriate actions to mitigate risks and optimize operations.

1.5 PROBLEM STATEMENT

The traditional forecast process employed by most NMHSs involves forecasters producing text-based, sensible, weather-element forecast products (e.g. maximum/minimum temperature, cloud cover) using numerical weather prediction (NWP) output as guidance. The process is typically schedule-driven, product-oriented and labour-intensive. Over the last decade, technological advances and scientific breakthroughs have allowed NMHSs’ hydrometeorological forecasts and warnings to become much more specific and accurate.

1.6 OBJECTIVES

Our project aims to predict the Weather and Atmosphere conditions using the previous dataset of the weather forecasting with a focus on improving the accuracy of prediction. This will increase the accuracy of the weather prediction and we will get accurate results than the traditional methods. Our dataset consists of max and min. temperature of everyday from the specific location.

Classifications: When gathering datasets to give to the models there are sure parameters which are called as ordered information which incorporates: snow, rainstorm, rain, mist, cloudy, for the most part overcast, halfway shady, scattered mists, and clear. These can be additionally ordered into four classes.

1. Rain, tempest, and snow into precipitation
2. For the most part shady, foggy, and cloudy into exceptionally shady
3. Scattered mists and somewhat shady into modestly shady
4. Clear as clear Thus our aim is to provide accurate result in order to provide correct prediction of weather for future so in critical conditions people can be aware of upcoming natural calamities.

LITERATURE SURVEY

Weather forecasting has come a long way from simply observing red sunsets and predicting fair weather. Today, it's a complex field that integrates various methodologies to provide increasingly accurate predictions. Here's a look at what the literature reveals:

2.1 Traditional Techniques

- **Statistical Methods:** These methods, like ARIMA (Autoregressive Integrated Moving Average) models, analyse historical data to identify patterns and trends for future predictions.
- **Numerical Weather Prediction (NWP)**:Uses the power of computers to make a forecast. Complex computer programs, also known as forecast models, run on supercomputers and provide predictions on many atmospheric variables such as temperature, pressure, wind, and rainfall. A forecaster examines how the features predicted by the computer will interact to produce the day's weather. The NWP method is flawed in that the equations used by the models to simulate the atmosphere are not precise. If the initial state is not completely known, the computer's prediction of how that initial state will evolve will not be entirely accurate.
- **Emergence of API-based Weather Forecasting** Discuss the shift towards API-based weather forecasting solutions and the role of technology in facilitating data access and integration. Introduce the paper under review, highlighting its focus on leveraging APIs for weather forecasting.

METHODOLOGY

1. Making a API Connection API connection is the essential and core component of our GUI Application. We have made the connection of the GUI with OpenWeatherAPI which provides us the Real Time weather data of a specific city. The Search Bar of the application accepts a city name of any part of the world and provides or displays the accurate weather details of that specific location.

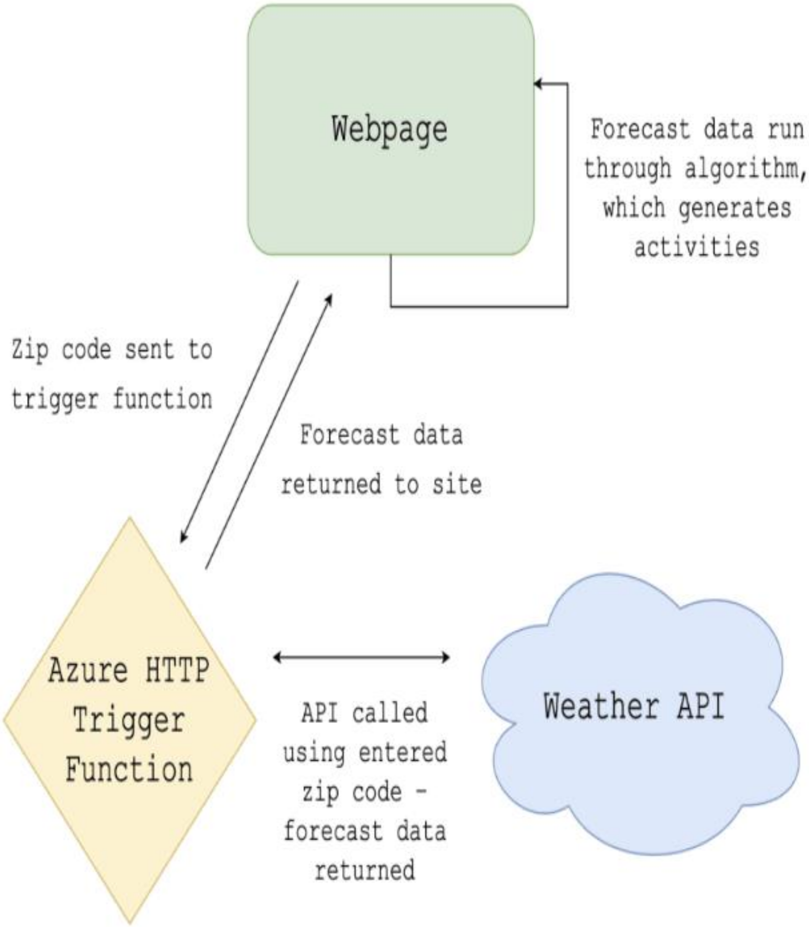

Webpage
Forecast data run through algorithm, which generates activities
Zip code sent to trigger function
Forecast data returned to site
Azure HTTP Trigger Function
API called using entered zip code - forecast data returned
Weather API

Table 3.1: Historical Weather Dataset of Kanpur City

2. Retrieving the Real Time Weather Data As we enter the city name in the search bar option of GUI application, our API retrieves or fetches the corresponding weather data of that specific location which is available and Displays it on the GUI.

RESULT & DISCUSSION

Python is a popular programming language: Python is widely used for developing various applications, including web development, machine learning, scientific computing, and data analysis. Its popularity makes it easier to find resources, libraries, and tools for development, as well as to hire developers if needed. Rich set of libraries and frameworks:

1. The application effectively provided users with the information they needed to plan and adapt to changing weather conditions.
2. This resulted in better-planned activities and potentially mitigated risks associated with adverse weather conditions.
3. Users appreciated the convenience of having real-time weather information at their fingertips and found the application to be a valuable tool for daily planning and decision-making.
4. These results validate the utility of technology-driven solutions in enhancing user resilience and preparedness in the face of unpredictable weather events.

4.1 Result of Weather Forecasting

Weather forecasting has become a vital tool for societies around the world. Here are some key results:

- **Improved Accuracy:** Modern weather forecasts are significantly more accurate than ever before, thanks to advancements in data collection, computer modelling, and meteorological science.
- **Informed Decisions:** Accurate forecasts empower individuals and businesses to make informed decisions about daily activities, travel plans, agricultural practices, and many other areas.

- **Economic Benefits:** Weather forecasts contribute significantly to economic well-being by reducing risks and optimizing operations in various sectors.
- **Safety and Preparedness:** Weather forecasts play a crucial role in warnings and advisories for severe weather events, helping communities prepare and mitigate potential damage.

4.2 Discussion on Weather Forecasting

There are also ongoing discussions and areas for improvement in weather forecasting:

- **Accuracy Limitations:** While forecasts have improved, there are still limitations, especially for long-term predictions and highly localized events.
- **Climate Change Impact:** The complexity of climate change introduces new challenges for forecasting models, requiring ongoing research and adaptation.
- **Communication and Public Understanding:** Effectively communicating forecast uncertainties and probabilities to the public remains an important area of focus.

Overall, weather forecasting is a success story in scientific advancement with significant societal benefits. However, researchers and forecasters continue to strive for better accuracy, especially in the face of a changing climate.

4.2 Designing the interface layout and components.

Designing a user interface for a weather forecasting application involves several considerations, such as the type of information to be displayed, the layout of the interface, and the visual style of the application. Here’s an example of how you might design the interface for a weather forecasting application using Python tkinter: Choose a layout: There are several options for the layout of the application, such as a single screen or multiple tabs. A good layout should be easy to navigate and should allow users to access the information they need quickly. In this example, we will use a single-screen layout. Choose the components: The components of the application should be selected based on the information that needs to be displayed. For a weather forecasting application, the following components may be included: Location selection: Allows users to select the location for which they want to view the weather information. Current weather information: Displays the current weather conditions for the selected location, such as temperature, humidity, wind speed, and precipitation. Weather forecast: Displays the forecasted weather conditions for the selected location over the next few days. Additional information: Allows users to access additional weather-related information, such as UV index, air quality, or radar maps. Visual style: The visual style of the application should be consistent and easy to read. A good visual style will make the application more appealing to users and enhance the user experience. In this example, we will use a clean and modern design with a blue and white colour scheme .

4.3 Dynamically updating weather data in the interface.

To dynamically update weather data in the interface of a weather forecasting application using Python, we can use the after() method in tkinter. The after() method schedules a function to be called after a specified delay, and can be used to periodically update the weather data in the interface. When the tkinter interface is run using root.mainloop(), the update weather() function is called to initially populate the labels with weather data. After 5 minutes, the after() method calls the update weather() function again, which updates the labels with new weather data, and so on. BUILDING A WEATHER FORECASTING APPLICATION USING API Section A-Research paper 1236 Eur. Chem. Bull. 2023,12(7), 1229-1241 By using the after() method in this way, the weather data in the tkinter interface is dynamically updated without the need for the user to manually refresh the page or interact with the application .

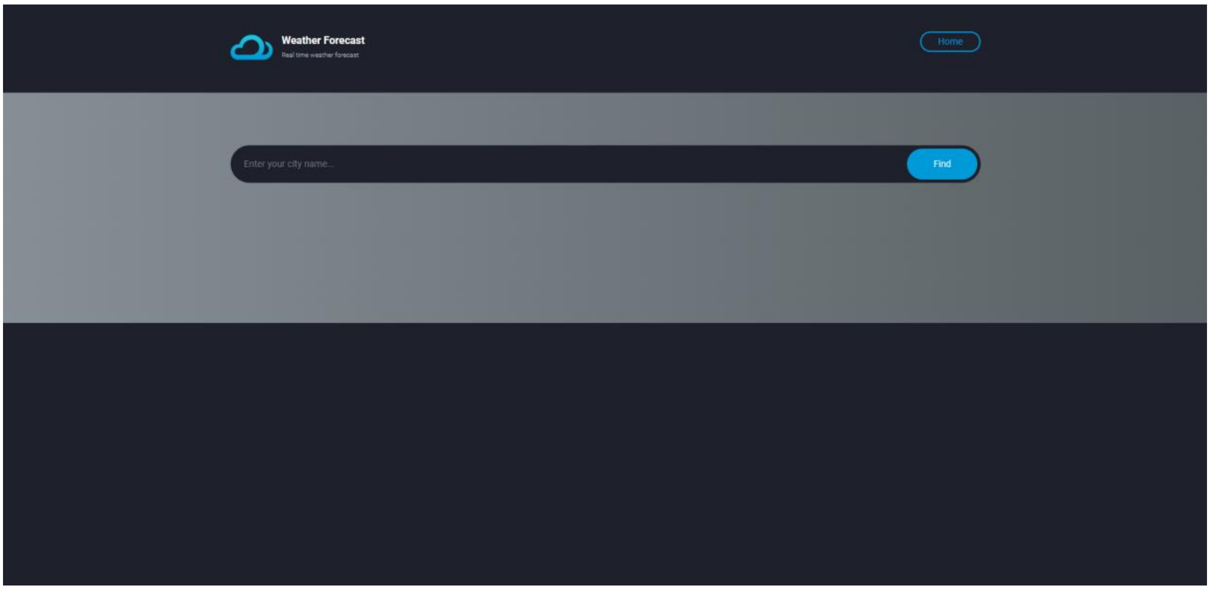
4.4 Displaying weather data using images, icons, and graphs.

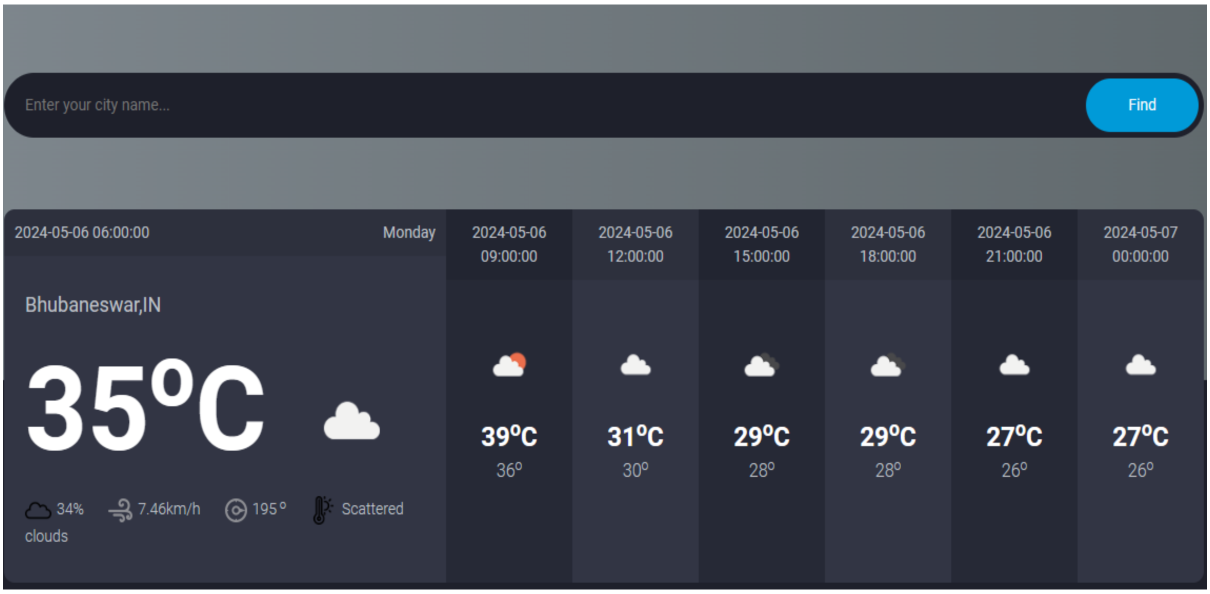
To display weather data using images, icons, and graphs in a weather forecasting application using Python tkinter, we can use various libraries and tools. Here are a few examples: Displaying weather icons: we can use the Weather Icons library to display weather icons based on the current weather conditions. The library contains a set of icons for various weather conditions such as cloudy, sunny, rainy, etc. we can use the library to display the appropriate icon based on the current weather conditions in your application. Displaying weather data using images: we can use various Python libraries such as Pillow, Matplotlib, or Seaborn to display weather data using images and graphs. For example, one can use Pillow to display a satellite image of the current weather r conditions, or Matplotlib to display a graph of temperature trends over time.

Accuracy of weather data: This metric would indicate how accurate the weather data is that is being retrieved from the API. It could be measured using a comparison between the forecasted weather data and the actual weather conditions over a period.

1. User satisfaction: This metric would indicate how satisfied users are with the application. It could be measured using surveys or user feedback forms to gather user opinions on the application's interface, ease of use, and overall functionality.

2. Performance: This metric would indicate how well the application performs in terms of speed and reliability. It could be measured using load testing and stress testing to identify any performance bottlenecks or issues.





2024-05-06 06:00:00 Monday

Bhubaneswar,IN

35°C

34% clouds 7.46km/h 195 ° Scattered

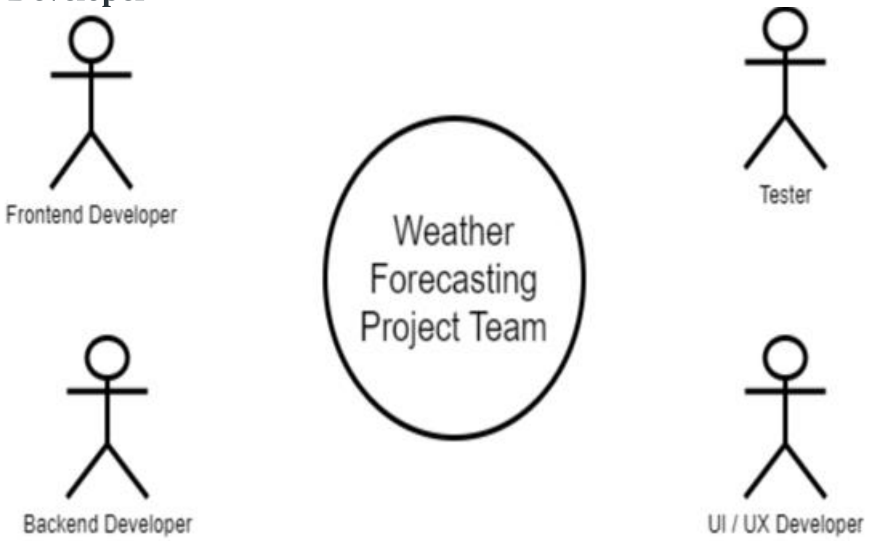
2024-05-06 09:00:00	2024-05-06 12:00:00	2024-05-06 15:00:00	2024-05-06 18:00:00	2024-05-06 21:00:00	2024-05-07 00:00:00
39°C	31°C	29°C	29°C	27°C	27°C
36°	30°	28°	28°	26°	26°

SYSTEM DEVELOPMENT

Step 1: Team Formation Phase:

Team formation is a crucial step in any project it significantly impact on your project . In our project as we will be exploring about the web application for weather app so will will be going to require following skill sets.

1. **Front end Development (Html , CSS).**
2. **Back end Development (Django).**
3. **Tester**
4. **UI/UX Developer**



Step 2: Creating Project Synopsys:

A project synopsis serves as a concise overview or summary of a proposed project, offering a brief but comprehensive insight into its objectives, scope, methodology, and expected outcomes.

1) 2.1 Introduction | Project Synopsys for Weather Forecasting Project :

Todays Weather app is a web application which will tell the users about the weather details of any particular city . The easy and Interactive User Interface will help our users to easily know about the temperature , wind speed , humidity and description about the weather .

2) 2.2 Problem Statement:

Current weather apps lack simplicity and speed, making it challenging for users to quickly access accurate information for specific cities. There is a need for a streamlined web application that prioritizes user-friendly interfaces, delivering real-time, precise weather details for informed decision-making in travel, planning, and daily activities.

3) 2.3 Proposed Solution for Weather Forecasting Project :

To overcome this the problem , We are going to make an web application using **Html , CSS** and **JavaScript** in which we will be providing user-friendly interface for easy navigation , Efficient weather searching , accurate and fast data collection.

4) Objective of the Project:

The objective of the Todays weather project is to design and implement an efficient and user-friendly system that helps user to know about weather details of any city using its name only.

Primary Goals of the project:

- **User-friendly Interface**
- **Accurate weather Details**
- **Fast data Fetching**

5) 2.2 Methodologies Used | Project Synopsys for Weather Forecasting Project :

In Weather App we are using various methodologies to solve our problems. Below are the detailed description about the technology used and methods we are applying in our project.

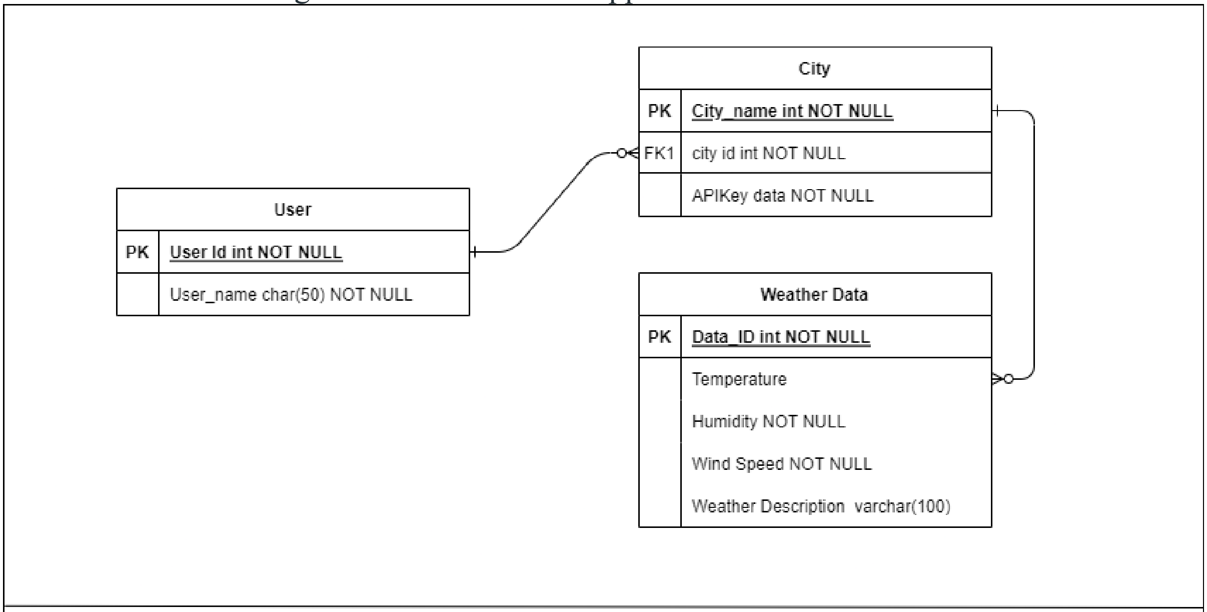
6) Technology Used:

Here we are developing a Weather application using **HTML**, **CSS** *for the frontend, and* **JavaScript** *for the backend involves a structured methodology. We are using OpenWeatherMap's* API *for the weather details .*

7) ER Model for Weather Forecasting Project :

An Entity-Relationship Diagram (ERD) for a Weather Application is the entities and their relationships within the system.

Let's Draw an ER Diagram for our Weather Application:



ER Diagram for Weather App

ER Diagram for Todays Weather App

Entities:

- **User:** Attributes User Id (Primary Key)
- **City:** Attributes : City Name (Primary Key) , API Key value.
- **Weather Details:** Attributes: Temperature , Wind Speed , Weather Description , Humidity.

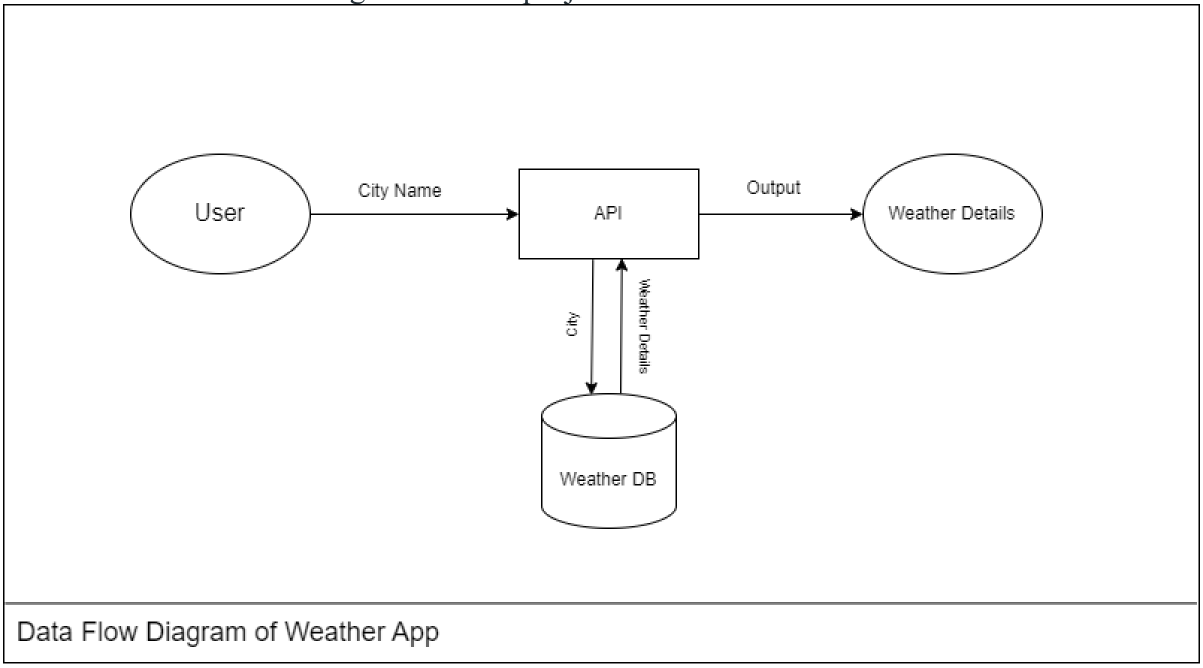
Relation:

- **Enters:** User enters the city name in the application.
- **Returns:** API returns an list of weather details having temperature , wind speed , humidity and weather details

8) Data Flow Diagram of Weather Forecasting Project :

serves as a visual representation of the flow of information within the system. This diagram illustrates how data, such as weather information, user details, and API Transactions in Weather Application.

Let’s Draw a Dataflow Diagram for our project:



Data Flow Diagram for Todays Weather Application

9) 2.3 Features | Project Synopsys for Weather Forecasting Project :

The proposed Weather Application is designed to simplify the way to get weather details about any city . These are the priority features for our project:

- **User-friendly Interface**
- Using Basic html, CSS and JS.
- **Accurate weather Details**
- Temperature in that city
- Wind speed in the city
- Weather Description
- Humidity
- **Fast data Fetching**
- Using open weather map’s api for it.

10) 2.4 Limitations | Project Synopsys for Weather Forecasting Project :

Weather Application can offer many benefits, it may also have certain limitations. Here are some potential constraints associated with such a system:

1. Reliability: The accuracy of weather information heavily depends on the reliability of the data source. If the application relies on a single source, discrepancies or inaccuracies in that source can impact the reliability of the weather data.

2. Dependency on External API’s: If the application relies on third-party APIs for weather data, it’s subject to the availability and performance of those APIs. Downtime or changes to the external service can affect the functionality of the application.

3. City Coverage: The availability and accuracy of weather data may vary for different cities. Some locations may have more comprehensive and accurate data than others, potentially leading to incomplete or less reliable information for certain areas.

4. Device and Network Dependency: The user experience can be affected by the device’s capabilities and network conditions. Slow internet connections or outdated devices may impact the responsiveness of the application.

5. Security and Privacy Concerns: Handling user data, such as location information, requires attention to privacy and security. Ensuring secure data transmission and storage is crucial to protect user information.

11) 2.5 Future Scope | Project Synopsys for Weather Forecasting Project :

The future scope of a Our Weather Application developed using HTML, CSS, JS is promising, with opportunities for enhancement and expansion.

Some potential future avenues for the project include:

1. Integration of Advanced Technologies: Explore the integration of emerging technologies such as artificial intelligence (AI) and machine learning (ML) for intelligent future weather predictions using past dataset.

2. **Mobile Applications:** We can develop mobile applications for the same. As there are more mobile users than website users.

3. User Feedback Mechanisms: Strengthen user feedback mechanisms to continuously gather input on system performance, identify areas for improvement, and enhance user satisfaction.

Step 3: Requirement Gathering –

This is the next phase after the submission of the synopsis report. We can do this process before the Synopsys report creation as well , It is all depends upon the project and their requirements. Here after getting an overview about the project now we can easily do the requirement gathering for our project.

Project (SRS):

12) 3.1.1 Purpose:

The main objective of this document is to illustrate the requirements of the project **Weather Forecasting** . The document gives the detailed description of the both functional and non-functional requirements proposed by the client.

Developing a comprehensive weather forecasting application that provides accurate and real-time weather information to users. The app aims to offer a user-

13) 3.1.2 Scope:

A weather forecasting application is a software tool designed to provide users with up-to-date and accurate information about current and future weather conditions. These applications leverage data from meteorological sources, satellites, and weather stations to deliver forecasts, real-time weather updates, and other related information.

The primary goal of a weather forecasting app is to offer users the ability to plan their activities based on anticipated weather conditions.

3.2 Overall Description | Todays Weather App:

14) 3.2.1 Product Perspective:

This app provides commercial weather forecasting services worldwide . it will utilize ideas passed by openweathermap and national weather services.

15) 3.2.2 System Interface:

The user interface for the task will have a site that will have the live feed alongside the data about the climate. This site will utilize html , CSS , JavaScript and API requests for site.

16) 3.2.3 Product Functions:

- It will show the current weather of the provided location.
- It will show the current wind speed of the location.
- It will also show the humidity level of the provided location.

17) 3.2.4 Operating Environment:

Todays weather app is an web application which you can run using your favourite browser. In the application provided details and information is provided by the open weather map website which will help us for api data fetching.

18) 3.2.5 Assumption and Dependencies:

Assumptions and dependencies play a crucial role in the development and operation of any application, including a weather forecasting web application. These factors influence the accuracy, reliability, and overall performance of the application.

Here are some key assumptions and dependencies for a weather forecasting web application:

19) Assumptions:

- Data Accuracy
- Stable Internet connection
- User Location Accuracy
- Data Source Availability

20) Dependencies:

- Api Integration
- Geolocation Services
- Server Infrastructure
- Data Storage
- Internet Connectivity

3.3 **Functional Requirements | Todays Weather App:**

21) 3.3.1 Software Requirements:

This software package is developed using html , CSS for frontend and JavaScript for the backend. Using Vs Code as a text editor and Google Chrome for the execution of our code.

Required Specifications for our Device:

- **Operating System**: Windows 7, 8, 9, 10 .
- **Language**: Html , Css , Javascript.
- **API** : Openweathermap api

22) 3.3.2 Hardware Requirements:

- **Processor**: Intel core i3 or above for a stable experience and fast retrieval of data.
- **Hard Disk**: 4GB and above
- **RAM**: 256 MB or more, recommended 2 GB for fast reading and writing capabilities which will result in better performance time.

3.4 **Non-Functional Requirements:**

23) 3.4.1 Usability Requirements

- Our user interface should be interactive simple and easy to understand . The system should prompt for the user and administrator to login to the application for proper input criteria.
- Weather Application shall handle expected and non expected errors in ways that prevent loss in information and long downtime period.

24) Security Requirements

- System should be using secure web forecasting API.
- Normal users can just read information about the weather but they cannot edit or modify anything except their personal and some other information if required.
- System will have different types of users and every user has access constraints.
- Proper user authentication should be provided.
- Personal details like location should not be stored for security purpose.

25) Availability Requirements

Availability requirements for a weather application using APIs are crucial to ensure that the service is consistently accessible and operational.

Here are key availability requirements:

- **Uptime Percentage:** Maintain a high level of service availability, such as 99.9% uptime. Users rely on the weather application for real-time information, so a high uptime percentage ensures that the service is consistently accessible.
- **Load Balancing:** Use load balancing to distribute incoming traffic across multiple servers or instances. Load balancing helps distribute the load evenly, preventing individual servers from becoming overwhelmed and improving overall system performance and availability.
- **Monitoring and Alerting:** Implement continuous monitoring of key metrics and set up alerting systems to notify administrators of any issues or anomalies. Proactive monitoring allows for the rapid identification and resolution of potential problems, minimizing downtime.

- **Scalability:** Design the system to be scalable, allowing for the seamless addition of resources during periods of increased demand. Scalability ensures that the application can handle varying levels of traffic and user activity without degradation in performance.
- **Backup and Recovery:** Regularly back up critical data and implement robust recovery procedures. In the event of data loss or system failures, a well-defined backup and recovery strategy ensures that the application can be restored quickly and efficiently.

26) Performance Requirements:

- The system shall accommodate high number of users simultaneously and users can check the weather of any location any number of times.
- Responses to view information shall take no longer than 5 seconds to appear on the screen.

27) Error Requirements:

Weather app shall handle expected and non-expected errors in ways that prevent loss in information and long downtime period.

An alert should be shown if the API is not working properly which will improve the uptime of the service.

Design:

The design phase in weather forecasting app development is a crucial stage where the conceptual ideas and requirements are transformed into a detailed and visually appealing blueprint. This phase involves creating the Data flow Diagrams, ER model design, and the overall architecture of the weather application

28) Data Flow Diagram of Weather Forecasting Project :

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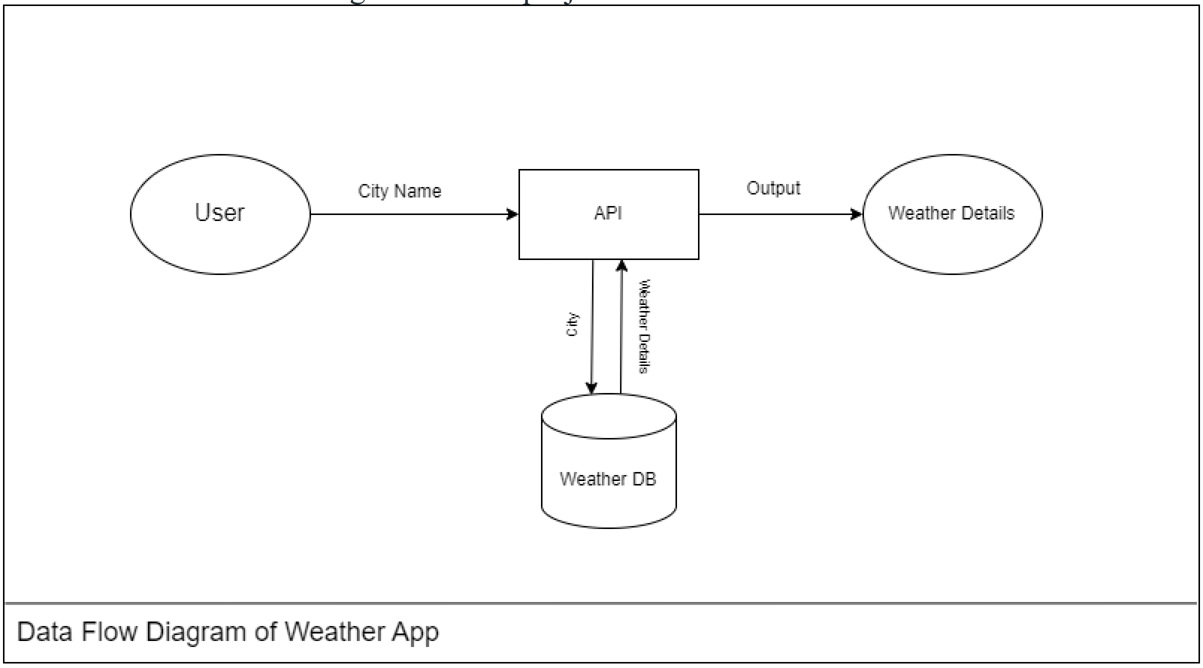

Data Flow Diagram for Weather Forecasting Project

29) 3.5.2 **ER Model for Weather Forecasting Project :**

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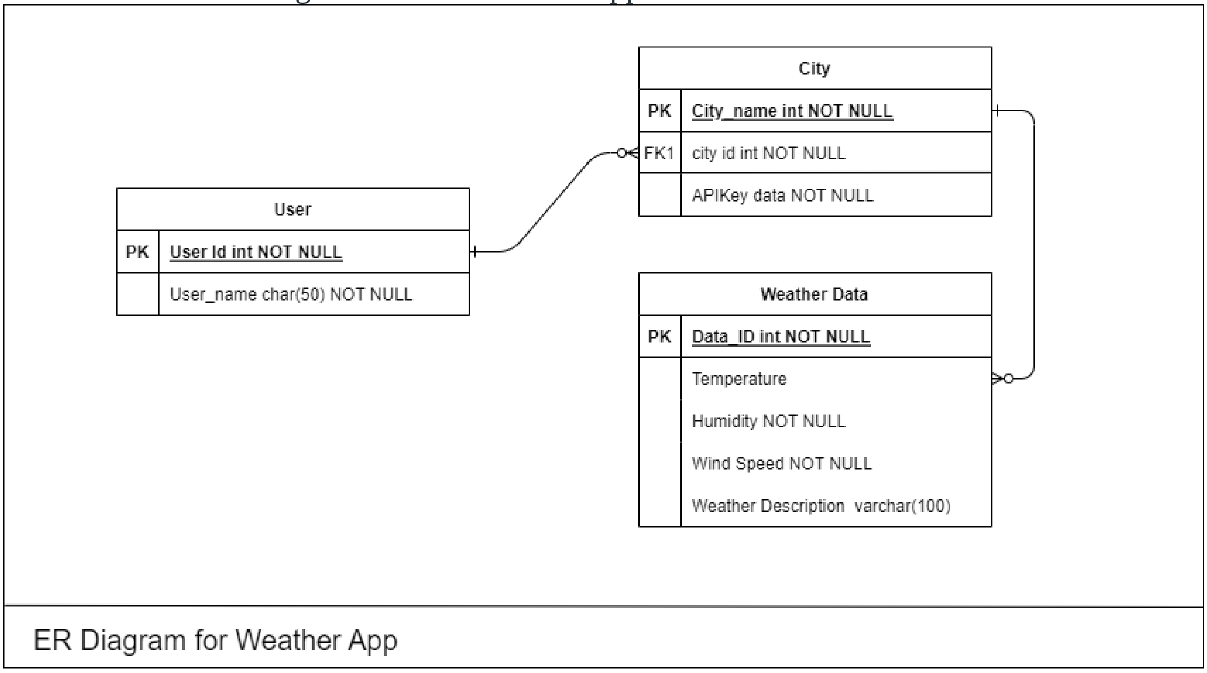

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Relation:

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30)

Step 4: Coding or Implementation of Weather Forecasting Project:

At this stage, the fundamental development of the product starts. For this, developers use a specific programming code as per the design. Hence, it is important for the coders to follow the protocols set by the association. Conventional programming tools like compilers, interpreters, debuggers, etc. are also put into use at this stage.

In our project we are using html , CSS and JavaScript to build the project so in this stage we are going to code our project. Before going further lets talk about the environment we need for the project.

4.1 **Environment Creation:**

In this stage we are going to create the environment to build our project, We will install all required software and extensions for ease in the coding part.

Required Softwares:

- **VsCode:** Vs Code is a widely used text editor for development purpose .
- **Google Chrome:** You need to install a web browser to execute the html code. You can use any of your favourite web browser.

Extensions :

- **Live Server**: You can use live server extension because It enables you to right-click an HTML document, and it runs a server for you and opens a browser window with the file in it.

CONCLUSION

In conclusion, building a weather forecasting application using REST API in Python is a valuable and practical project that can provide users with reliable weather information. Overall, building a weather forecasting application using REST API in Python is an exciting and rewarding work that can provide valuable information to users. By following best practices and BUILDING A WEATHER FORECASTING APPLICATION USING API Section A-Research paper 1240 Eur. Chem. Bull. 2023,12(7), 1229-1241 taking key considerations into account, developers can create a reliable, accurate, and userfriendly application that meets the needs of their target audience. We've given the first formal description of JSON Schema's syntax and semantics in response to the issues caused by the lack of a formal specification for it. We have carried out a rigorous analysis of the schema validation issue and presented effective solutions. We test our own validation tool to demonstrate the practical application of JSON Schema and demonstrate that it performs well both when processing artificially generated data and when tested against the whole Wiki data database. If the errors are going to be deducted by choosing the latest API methods and fix the issues for getting the weather report while having no access to the internet, this will be referred as our future work.

FUTURE WORK

Future Work for the Weather Forecasting Web Application includes improving forecast accuracy, expanding features like alerts and historical data analysis, and developing mobile versions for iOS and Android. Global coverage and localization efforts will cater to diverse user bases, while community-building features and partnerships will enhance engagement and data quality. Integration with IoT devices and ongoing accessibility improvements ensure seamless access for all users. Long-term impact studies will assess user behavior and community resilience, guiding iterative design improvements based on user feedback and usability testing.

REFERENCES

1. Brastein, O.M., Perera, D.W.U., Pfeifer, C. and Skeie, N.O., 2018. Parameter estimation for grey-box models of building thermal behaviour. Energy and Buildings, 169, pp.58-68.

2. Abrahamsen, Erik, Ole Magnus Brastein, and Bernt Lie. "Machine learning in python for weather forecast based on freely available weather data." In Proceedings of The 59th Conference on Simulation and Modelling (SIMS 59), 26-28 September 2018, Oslo Metropolitan University, Norway, no. 153, pp. 169-176. Linköping University Electronic Press, 2018.

3. S. Zhang, W. Wang, X. Gao, and C. Liu, "Design and implementation of weather forecasting service based on RESTful web service," in 2013 IEEE 10th International Conference on Ubiquitous Intelligence and Computing and 2013 IEEE 10th International Conference on Autonomic and Trusted Computing (UIC/ATC), Vietri sul Mare, Italy, 2013, pp. 428-434.

4. Selvik, J. T., Bansal, S., & Abrahamsen, E. B. (2021). On the use of criteria based on the SMART acronym to assess quality of performance indicators for safety management in process industries. Journal of Loss Prevention in the Process Industries, 70, 104392.

5. Abrahamsen, E. B., Selvik, J. T., Dahle, A. N., Asche, F., & Abrahamsen, H. B. (2018). A socio-economic analysis of increased staffing in the Norwegian helicopter emergency medical service. Scandinavian Journal of Trauma, Resuscitation and Emergency Medicine, 26, 1-9. 6. Chen, Rung-Ching, et al. "Selecting critical features for data classification based on machine learning methods." Journal of Big Data 7.1 (2020): 52. 7. Liu, Lijuan, Rung-Ching Chen, and Shunzhi Zhu. "Impacts of weather on short-term metro passenger flow forecasting using a deep LSTM neural network." Applied Sciences 10.8 (2020): 2962. 8. Bochenek Bogdan, and Zbigniew Ustrnul. "Machine learning in weather prediction and climate analyses—applications and perspectives." Atmosphere 13.2 (2022): 180.