Weather Forecasting system

Submitted in partial fulfillment of the requirements for the award of Bachelor of Science degree in computer Science

by

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DEPARTMENT OF COMPUTER SCIENCE
SCHOOL OF COMPUTING

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)
Accredited with Grade "A" by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the Bonafide work of Parasuram B R (39290077) and Joel L (39290128) who carried out the project entitled "Weather Forecasting System" under our supervision from December 2021 to March 2022.

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Submitted for Viva voce Examination held on_____

Internal Examiner **External Examiner**

DECLARATION

I, Parasuram B R (39290077) and Joel L (39290128) hereby declare that the Project Report entitled *"*Weather Forecasting System" done by me under the guidance of Dr. Kanipriya is submitted in partial fulfillment of the requirements for the award of Bachelor of Science degree in Computer Science.

DATE: 11.03.2022

PLACE: Chennai **SIGNATURE OF THE CANDIDATE**

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ABSTRACT

Weather forecasting is one of the most scientifically and technologically challenging problems around the world in the last century. To make an accurate prediction is indeed, one of the major challenges that meteorologists are facing all over the world. To predict the conditions of the atmosphere for a given location, Weather Forecasting is used. Weather forecasting is made by collecting numerous data predicted by very proper understanding of the collected data. Weather simply refers to the condition of air on the earth at given place and time. It is a continuous, data-intensive, multidimensional, dynamic and chaotic process. These processes make weather forecasting a formidable challenge.

Forecasting is the process of estimation in unknown situations from the historical data. It is the application of science and technology. Weather forecast is more helpful for people as it predicts how the future weather is going to be and people may plan accordingly. Farmers will be most beneficial one's as they may know the rainfall prediction accordingly. The weather forecast can be done in many ways like using the previous data or analyzing the current clouds.

This proposed application concentrates on weather forecasting with an improved prediction and reliable accuracy. Traditional observations made at the surface of atmospheric pressure, temperature, wind speed, wind direction, humidity, precipitation are collected routinely from trained observers, automatic weather stations or buoys. During the data assimilation process, information gained from the observations is used in conjunction with a numerical model's most recent forecast for the time that observations were made to produce the meteorological analysis.

Numerical weather prediction models are computer simulations of the atmosphere. They take the analysis as the starting point and evolve the state of the atmosphere forward in time using understanding of physics and fluid dynamics. The complicated equations which govern how the state of a fluid changes with time require supercomputers to solve them. The output from the model provides the basis of the weather forecast.

LIST OF ABBREVIATIONS

Abbreviation	Expansion
RAM	Random Access Memory
HTML	Hyper Text Markup Language
CSS	Cascading Style Sheets
SQL	Structured Query Language
JSON	Java Script Object Notation
API	Application Programming Interface

LIST OF FIGURES

CHAPTER - 1

INTRODUCTION

1.1 Overview of the Project

Weather prediction is the application of technology to predict the action of the atmosphere for a given location. It is becoming increasingly vital for business, agriculturists, farmers, disaster management and related organizations to understand the natural phenomena. The art of weather prediction began with using the reoccurring astronomical and meteorological events to help them to monitor the seasonal changes in the weather. Throughout these centuries, this attempt is made to produce forecasts based on weather changes and personal observations. Weather prediction has been one of the most interesting domains.

The scientists are been trying to forecast the meteorological data using a big set of methods, some of them more accurate than others. Weather forecasting is an essential application in meteorology and has been one of the most scientifically challenging problems around the world. Weather condition is a state of atmosphere at given time and the weather parameters are temperature, humidity, and wind speed. The accuracy of the prediction depends on knowledge of prevailing weather condition over large areas. Weather is the non-linear and dynamic process as it varies day to day even minute to minute; the big challenge of weather is data intensive and the frenzied nature.

Weather forecasting means predicting the weather and telling how the weather changes with change in time. Change in weather occurs due to movement or transfer of energy. Many meteorological patterns and features like anticyclones, depressions, thunderstorms, hurricanes and tornadoes occur due to the physical transfer of heat and moisture by convective process. Clouds are formed by evaporation of water vapour. As the water cycle keeps on evolving the water content in the clouds increases which in turn leads to precipitation.

It is also possible to identify the different types of cloud associated with different patterns of weather. These patterns help in predicting the weather forecast.We are always with or around a weather forecast; we always carry it with us and never want to be away from it.

Weather forecasting is one of the prominent topics that have influenced people's lives and activities over a long time. It is a kind of scientific activity, contributing to the social and economic welfare in many sections of the society.

Weather forecasts are issued to protect life and property, save life and tell us what changes to except in the atmosphere. They provide vital information to a wide range of categories: agriculture, aviation, commerce, marine, advisories, etc. Forecasting can also significantly influence decision and policymaking, construction planning, productivity and environmental risk management. People can also know and be aware of atmospheric changes through variables such as temperature, wind speed and direction, cloudiness and precipitation.

CHAPTER – 2

LITERATURE SURVEY

Mark Holmstrom, Dylan Liu, Christopher Vo (2016) concluded that both linear and functional regression did not perform as well as professional weather forecasting methods but in the longer run differences in their performances decreased, suggesting that over a longer period of time, Machine learning can indeed outperform professional and traditional methods. Linear regression is a low bias and high variance algorithm and hence its accuracy can be improved by collecting further data.

Sanyam Gupta, Indumathy, Govind Singhal (2016) suggested and proposed an efficient and accurate weather prediction and forecasting model using linear regression concepts and normal equation model. All these concepts are a part of machine learning. The normal equation is a very efficient weather prediction model and using the entities temperature, humidity and dew-point, it canbe used to make reliable weather predictions. This model also facilitates decision making in day to day life. It can yield better results when applied to cleaner and larger datasets.

Aditya Grover, Ashish Kapoor and Eric Horvitz in their work made a weather prediction model that predicts by considering the joint influence of key weather variables. They also made a kernel and showed that interpolation of space can be done by using GPS with such a kernel, taking into account various weather phenomena like turbulence. They also performed temporal analysis withina learner based on gradient tree and augmented the system using deep neural network.

Muthulakshmi A, ME (SE), Dr. S Baghavathi Priya (2015) in their work proposed a methodology that aims at providing an efficient and accurate weather forecasting models to predict and monitor the weather datasets to predict rainfall. In the past, the parameters of weather were recorded only for the present time. But in the future, work will be done to make a working model of selection that can be used for classifying the framework for continuous monitoring of the climatic attributes.

Divya Chauhan and Jawahar Thakur (2013) made a comparison in their paper, which shows that the algorithms such as k-mean clustering and decision trees are well suited for mining data to predict future weather conditions. If we increase the size of the training set, the accuracy at first increases but then it slowly decreases after a particular period of time, depending on the size of the dataset.

Piyush Kapoor and Sarabjeet Singh Bedi (2013) concluded that if we perform comparison of weather condition variation by sliding window algorithm, theresults are highly accurate except for the months of seasonal change. The results can be altered by changing the size of the window. Accuracy of the unpredictable months can be increased by increasing the window size to one month.

Qing Yi Feng1, Ruggero Vasile, Marc Segond , AviGozolchiani , Yang Wang, Markus Abel, ShilomoHavlin , Armin Bunde , and Henk A. Dijkstra1(2016) havemade a machine-learning toolbox which is based on climate data gathered fromanalysis and reconstruction of complex networks. It can also handle data containing multiple variables from these networks. The development of predictor models in the toolbox is dynamic and data-driven.

Siddharth S. Bhatkande, Roopa G. Hubballi(2016) In their work the authors have used data mining technique and Decision tree algorithm as a means to classify weather parameters like maximum temperature, minimum temperature in terms of day, month and year.

John K. Williams and D. A. Ahijevych, C. J. Kessinger, T. R. Saxen, M. Steiner and S. Dettlinghave shown in their work that a set of skillful predictors for thunderstorm initiation can be identified by using the random forest machine learning algorithm. The random forest method can also be used to identify “regimes” in which they can improve the skill of the application by using forecast logic.

CHAPTER - 3

AIM AND SCOPE OF PRESENT INVESTIGATION

3.1 Aim of the project

People can get accurate weather information is the main aim of this application. The important issue faced in our country is climatic changes and that can be resolved by our application “WEATHER FORECASTING SYSTEM”. The goal of weather prediction is to provide information. People and organizations can use to reduce weather related loses and enhanced societal benefits, including protection of life and property, public health and support of economic prosperity and quality of life.

3.2 Scope and Objective

Weather forecasts are made by collecting as much data as possible about the current state of the atmosphere (particularly the temperature, humidity and wind) and using understanding of atmospheric processes (through meteorology) to determine how the atmosphere evolves in the future.

However, the chaotic nature of the atmosphere and incomplete understanding of the processes mean that forecasts become less accurate as the range of the forecast increases.

To develop software for forecasting the weather involving wind speed, cloud cover, rain or snow in order to nurture the needs of people all around theglobe.

To develop a weather forecasting application on which people can completely rely for their weather updates. The scope for weather forecasting system will keep on increasing as thetechnology progresses.

CHAPTER - 4

MATERIALS AND METHODS USED

4.1 System Requirements

4.1.1 Hardware Requirements

The most common set of requirements defined by any operating system or software application is the physical computer resources, also known as hardware. The minimum hardware requirements are as follows,

- Hard disk : 40 GB and Above
- RAM : 512 MB and Above
- Processor : Intel I3 and Above

4.1.2 Software requirements

Software requirements deals with defining resource requirements and prerequisites that needs to be installed on a computer to provide functioning of an application. The minimal software requirements are as follows,

1. Python
2. Visual Studio Code
3. Windows / Mac

4.1.2.1 Front-End part

- HTML
- CSS
- Bootstrap
- Java Script

4.1.2.2 Back-end part

- Django
- SQLite 3

4.1.3 Python Language

Python is an object-oriented programming language created by Guido Rossum in 1989. It is ideally designed for rapid prototyping of complex applications. It has interfaces to many OS system calls and libraries and is extensible to C or C++. Many large companies use the python programming language include NASA, Google, YouTube, BitTorrent, etc. Python Programming is widely used in Artificial Intelligence, Natural Language Generation, Neural Networks and other advanced field of Computer Science.

Python is one of the languages that is witnessing incredible growth and popularity year by year. In 2017, Stack overflow calculated that python would beat all other programming languages by 2020 as it has become the fastest-growing programming language in the world.

4.1.3.1 Python Libraries and Frameworks

Due to its corporate sponsorship and big supportive community of python, python has excellent libraries that you can be use to select and save your time and effort on the initial cycle of development. There are also lots of cloud media services that offer cross-platform support through libraries- like tools, which can be extremely beneficial.

Libraries with specific focus are also available like nltk for natural language processing or scikit-learn for machine learning application.

There are many frameworks and libraries are available for python language, such as:

- Matplotib for plotting charts and graph
- Scipy for engineering application, science, and mathematics
- Beautifulsoup for HTML parsing and XML

- Numpy for scientific computing
- Django for server-side web development

4.1.3.2 Versatility, Efficiency, Reliability, and Speed

Ask any python developer, and they will wholeheartedly agree that the python language is efficient, reliable, and much faster than most modern languages. Python can be used in nearly any kind of environment, and one will not face any kind of performance loss issue irrespective of the platform one is working.

One more best thing about versatility of python language is that it can be used in many varieties of environments such as mobile applications, desktop applications, web development, hardware programming, and many more. The versatility of python makes it more attractive to use due to its high number of applications.

4.1.3.3 Visual Studio Code

Visual studio code is a source-code editor that can be used with a variety of programming languages, including Java, JavaScript, Go, Node.js, Python and C++. It is based on the Electron framework, which is used to develop Node.js Web application that run on the Blink layout engine. Visual studio code employs the same editor component used in Azure DevOps.

Instead of a project system, it allows users to open one or more directories, which can be saved in workspaces for future reuse. This allows it to operate as a language-agnostic code editor for any language. It supports a number of programming language and a set off features that differs per language. Unwanted files and folders can be excluded from the project tree via the settings. Many visual studio code features are not exposed through menus or the user interface but can be accessed via the command palette.

Visual studio code can be extended via extensions, available through a central repository. This includes additions to the editor and language support. A notable feature is the ability to create extensions that add support for new languages, themes and debuggers, perform static code analysis, and add code linters using the language server protocol.

Out of the box, visual studio code includes basic support for most common programming languages. This basic support includes syntax highlighting, bracket matching, code folding, and configuring snippets. Visual studio code also ships with intelliSense for Java script, TypeScript, JSON, CSS, and HTML, as well as debugging support for Node.js. support for additional languages can be provided by freely available extensions on the VS code Marketplace.

Visual Studio Code collets usage data and sends it to Microsoft, although this can be disabled. However, because of the open-source nature of the application, the telemetry code is accessible to the public, who can see exactly what is collected.

4.1.4 Django

Django is a high-level python web framework that encourage rapid development and clean, pragmatic design. Built by experienced developers, it takes care much of the hassle of web development, so you can focus on writing your app without needing to reinvent the wheel. It’s free and open source.

Library**:** Django includes dozens of extras you can use to handle common web development tasks. Django takes care of user authentication content administration, site map, RSS feeds, and many tasks- right out of the box.

Security**:** Django takes security seriously and helps developers avoid many common security mistakes, such as SQL injection, cross-site scripting, cross-site request forgery and click jacking. Its user authentication systemprovides a secure way to manage user accounts and passwords.

Scale**:** Django uses a component-based “shared-nothing” architecture (each part of the architecture is independent of the others, and can hence be replaced or changed if needed). Having a clear separation between the different parts means that it can scale for increased traffic by adding hardware at any level: catching services, database servers, or application servers. Some of the busiest sites have successful scaled Django to meet their demand (e.g. Instagram and Disqus, to name just two).

4.1.4.1 Complete

Django follows the “Batteries include” philosophy and almost everything developers might want to do “out of the box”. Because everything you need is part of the one “product”, it all works seamlessly together, follows consistent design principles.

4.1.4.2 Versatile

Django can be (and has been) used to build almost any type of website from content management systems and wikis, though to social networks and news sites. It can work with any client-side framework, and can deliver content in almost any format (including HTML, RSS feed, JSON, XML, etc). The site you are currently reading is built with Django!

Internally, while it provides choices for almost any functionally you might want (e.g. several popular database, templating engines, etc.), it can also be extended to use other components if needed.

4.1.4.3 Maintainable

Django code is written using design principles and patterns that encourage the creation of maintainable and reusable code. In particular, it makes use of the Don’t Repeat Yourself (DRY) principle so there is no unnecessary duplication, reducing the amount of code. Django also promotes the grouping of related functionally into reusable “applications” and, at a lower level, groups related code into modules (along the lines of the Model view controller (MVC) pattern).

4.1.4.4 Portable

Django is written in python, which runs on many platforms. That means that you are not tied to any particular server platform, and run your applications on many flavours of Linux, Window, and Mac OS X. Furthermore, Django is well-supported by many web hosting providers, who often provide specific infrastructure and documentation for hosting Django sites.

4.1.5 Bootstrap

Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains HTML, CSS and (optionally) JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components.

Bootstrap provides basic style definitions for all HTML elements. The result is a uniform appearance for prose, tables and form elements across web browsers. In additional, developers can take advantage of CSS classes define in Bootstrap to further customize the appearance of their contents. For example, Bootstrap has provisioned for light and dark colored tables, page headings, more prominent pull quotes, and text with a highlight.

Bootstrap also comes with several JavaScript components in the form of jQuery plugins. They provide additional user interface elements such as dialog boxes, tooltips, and carousels. Each Bootstrap component consists of an HTML structure, CSS declarations, and in some cases accompanying JavaScript code. They also extended the functionality of some existing interface elements, including for example an auto-complete function for input fields.

4.1.5.1 Features

Bootstrap comes with a whole barrelful of components you can easily tack onto your web page, including:

- Navigation bars
- Dropdowns
- Progress bars
- Thumbnails

Bootstrap comes with its own code for automatically resizing images based on the current screen size. Just add the .img-responsive class to your images, and the predefined CSS rules take of the rest. No more spending hours coding your own grid-Bootstrap come with its own grid system predefined.

4.1.6 Java Script

JavaScript is a light-weight object-oriented programming language which is used for several website for scripting the webpages. It is an interpreted full-fledged programming language that enables dynamic interactivity on website when applied to an HTML document. It was introduced in the year 1995 for adding programs to the webpage in the Netscape Navigator browser. Since then, it has been adopted by all other graphical web browsers. With JavaScript, users can build modern web applications to interact directly without reloading the page every time. The traditional website uses js to provide serval forms of interactivity and simplicity.

Although, JavaScript has no connectivity with Java programming language. the name was suggested and provided in the times when Java was gaining popularity in the market. In addition to web browsers, databases such as CouchDB and MongoDB uses JavaScript as their scripting and query language.

4.1.6.1 Application of JavaScript

JavaScript is used to create interactive website. It is mainly used for:

- Client-side validation,
- Dynamic drop-down menus,
- Displaying date and time,
- Displaying pop-up window and dialog boxes (like an alert dialog box, confirm dialog box and prompt dialog box),
- Displaying clocks etc.

4.1.6.2 Features of JavaScript

1. All popular web browser support JavaScript as they provide built-in execution environment
2. JavaScript follows the syntax and structure of the C programming language. Thus, it is a structured programming language.
3. JavaScript is a weekly typed language, where certain types are implicitly cast (depending on the operation).
4. JavaScript is an objected-oriented programming language that uses prototypes rather than using classes for inheritance.
5. It is a case-sensitive language.
6. It is a light-weight and interpreted language.
7. JavaScript is supported in several operating systems including, Windows, macOS, etc.
8. It provides good control to the users over the web browsers.

4.1.7 HTML

The Hyper Text Markup Language or HTML is the standard markup language for documents designed to be displayed in a web browser. It can be assisted by technologies such as Cascading Style Sheets (CSS) and scripting languages such as JavaScript.

Web browser receives HTML documents from a web server or from local storage and render the documents into multimedia web pages. HTML describes the structure of a web page semantically and original included cues for the appearance of the documents.

HTML elements are the building blocks of HTML pages. With HTML constructs, images and other objects such as interactive forms may be embedded into the rendered page. HTML provides a means to create structured documents by denoting structural semantics for text such as heading, paragraphs, lists, links, quotes and other items. HTML elements are delineated by tags written using angle brackets. Tags such as <img/> and <input/> directly introduce content into the page. Other tags such as <p> surround and provide information about document text and may include other tags as sub-elements. Browsers do not display the HTML tags but use them to interpret the content of the page.

HTML can embed programs written in a scripting language such as JavaScript, which affects the behavior and content of web pages. Inclusion of CSS defines the look and layout of content. The World wide Web consortium (W3C), former maintainer of the HTML and current maintainer of the CSS standards, has encouraged the use of CSS over explicit presentational HTML since 1997. A form of HTML, known as HTML5, is used to displayed video and audio, primarily using the <canvas> element, in collaboration with Java script.

Originally, HTML was developed with the intent of defining the structure of documents like headings, paragraphs, lists, and so forth to facilitate the sharing of scientific information between researches. Now, HTML is being widely used to format web pages with the help of different tags available in HTML language.

HTML is a must for students and working professionals to become a great software Engineer especially when they are working in web development domain.

I will list down some of the key advantages of learning HTML:

- Create Web site – You can create a website or customize an existing web template if you know HTML well.
- Become a web designer – If you want to start a career as a professional web designer, HTML and CSS designing is a must skill.
- Understand web – If you want to optimize your website, to boost its speed and performance, it is good to know HTML to yield best results.
- Learn other languages – Once you understand the basic of HTML then other related technologies like JavaScript, PHP, or angular are become easier to understand.

4.2 Design Methodology

4.2.1 Existing System:

Weather forecasting is the application of science and technology to predict the state of the atmosphere for a given location. Weather forecasts are made by collecting quantitative data about the current state of the atmosphere and using scientific understanding of atmospheric processes to project how the atmosphere will evolve. There are a variety of end users to weather forecasts. Weather warnings are important forecasts because they are used to protect life and property.

In ancient times, forecasting was mostly based on weather pattern observation. Over the years, the study of weather patterns has resulted in various techniques for rainfall forecasting. Present rainfall forecasting embodies a combination of computer models, interpretation, and an acquaintance of weather patterns. So, we created a web application to predict the weather in accuracy format to help user can get the weather detail.

4.2.2 Proposed System:

Weather report application is a web based application through which you will able to get all the reports related to weather forecasting of any locations. Its geographical locator which will be received through your browser setting and server configuration will automatically identify the location and able to present its weather details such as Temperature, Direction of Wind, Humidity etc.

To develop software for forecasting the weather involving Wind Speed, Cloud Cover, Rain or Snow in order to nurture the needs of any person around the world.

4.3 Module Description

4.3.1 Module 1: Interactive Web Application

An interactive website is essentially an internet page that uses different kinds of software to create a rich, interactive experience for the user. The Django framework and bootstrap present themes gives the web application a pleasant look to interact with, it provides a simple and yet sophisticated look to the user every time they into the web application.

4.3.2 Module 2: Location Based Prediction

Where the user will be naming the location for which he wants to know the weather updates. After entering the city name, this model gives the weather forecast for the city entered by the user by providing details like Date, Time Maximum Temperature, Minimum Temperature and picture describing rainfall or sunshine. It also predicts the future of weather in maximum and minimum temperature with accuracy.

The user can also view the same result in graphical representation module which the amount of rainfall in centimeters and the amount of sunshine in degrees.

4.3.3 Module 3: Graphical Representation

Bootstrap polishes the application with a better user interface which is elegant and simple for better user experience. The application features color full theme like orange, gray etc. allocated for the title, topics and user greeting on the home page.

4.4 System Implementation

The application is going to be constructed through python IDE for GUI and SQLlite3 for database management. It is designed to improve the accuracy enchance safety and effieciency of database. It is a web application based system which helps us to improve the accuracy of the forecast. The homepage with a banner explains the web page’s monologue with a title. In

which users can enter the city name to know about weather forecasting about that city. Once the user enter the city name and click the find weather forecast they can see the accurate weather forecast of that city. The user can also see the weather forecast in graphical method. The application has a neat user interface for better interaction and it works smoothly.

4.4.1 ARCHITECTURE EXPLANATION

The architecture diagram Fig 4.1 explains the entire flow of the proposed system. Normally, every state has a weather department (e.g.) Tamil Nadu, Andhra Pradesh etc. In that weather department they have an antenna called automatic weather station, with the help of that antenna we can predict the climate whether the rain has come or not. So, this is weather data gathering tool. In this place gathering information are stored in the processed weather data storage. Our web application gets weather information in that data storage. The processed weatherdata will go to user authentic for forecast which means user have a subscription based plans like SMS or E-mail they have means, automatically they get weather information through web browsing not even to type places. Other thanthat, initially the user will be requested to enter the location for which he wishesto know the weather forecasting. After the user enters the location, it will go to web service system. Web service split the information comes from the data storage, the server configuration identifiers the location using geographical locator to get accurate data what actually end user wants. Once the location has been identified, the corresponding weather forecasted will be presented within fraction of seconds to the end user.

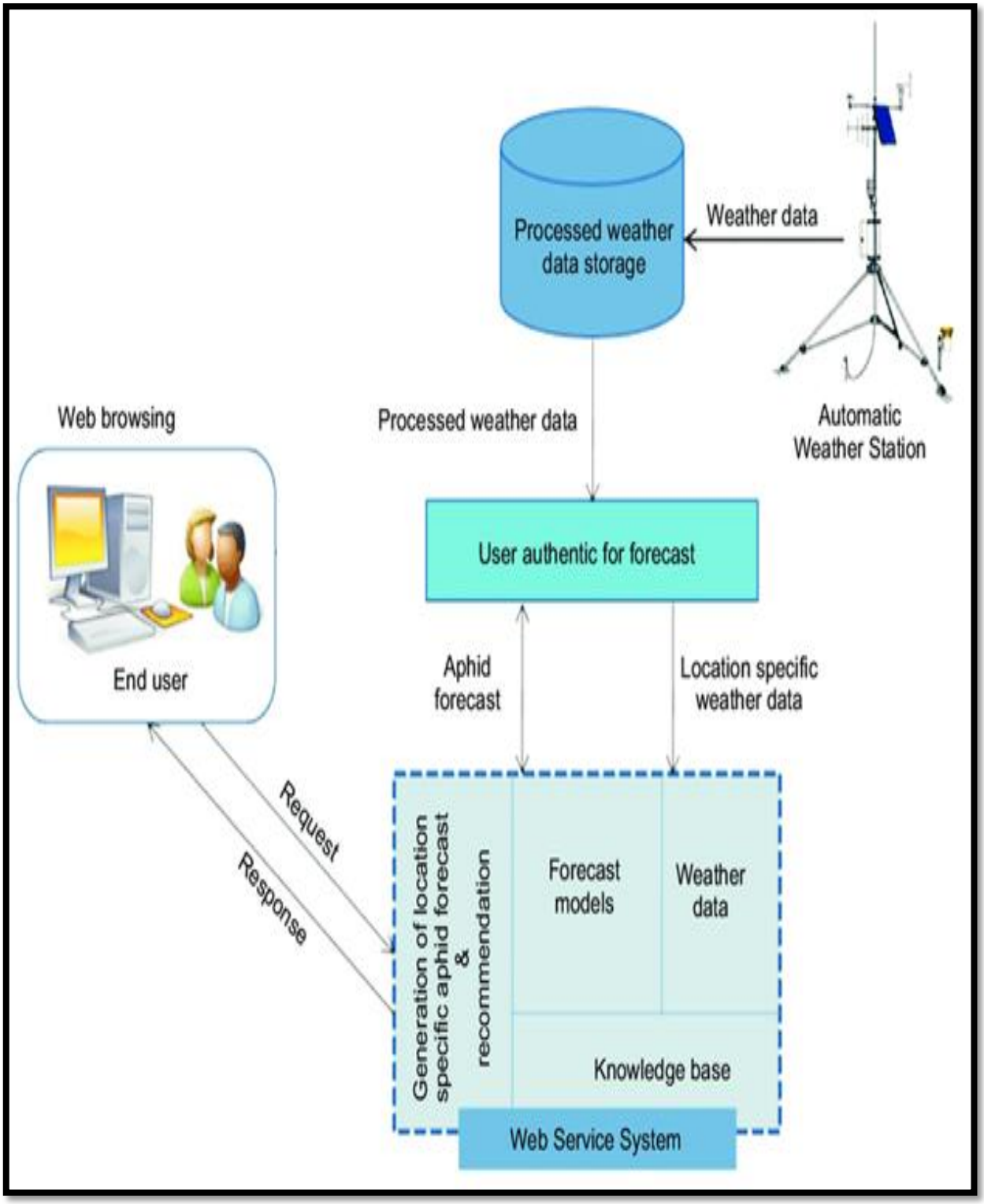

Figure 4.1 Architecture Diagram

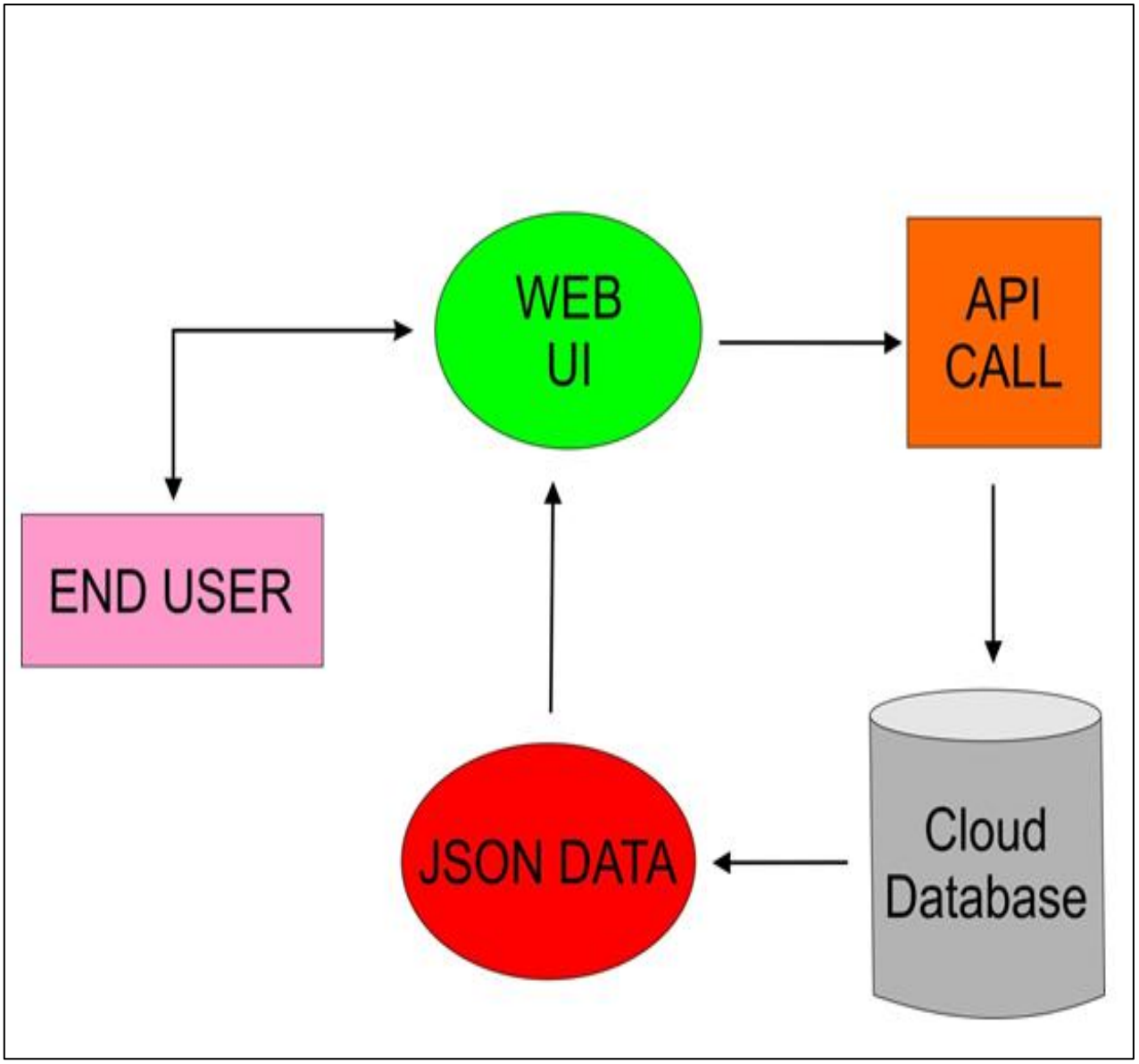

Figure 4.2 Data Flow Diagram

4.4.2 Data Flow Explanation

When the end user request the weather forecasting information from the web application and it will directly go the API call. API call is the process of a user application submitting a request to an API and that API retrieving the requested data from the external server or program and delivering it back to the client. After API call it will go to the cloud database in which all the weather data information are saved in a database. From database it will go into JSON data. JSON data is an open standard file format and data interchange format that uses human-readable text to store and transmit data objects consisting of attribute value pairs and arrays. It is a common data format with diverse uses in electronic data interchange.

CHAPTER - 5

RESUTS AND PERFORMANCE ANALYSIS

5.1 Home Page

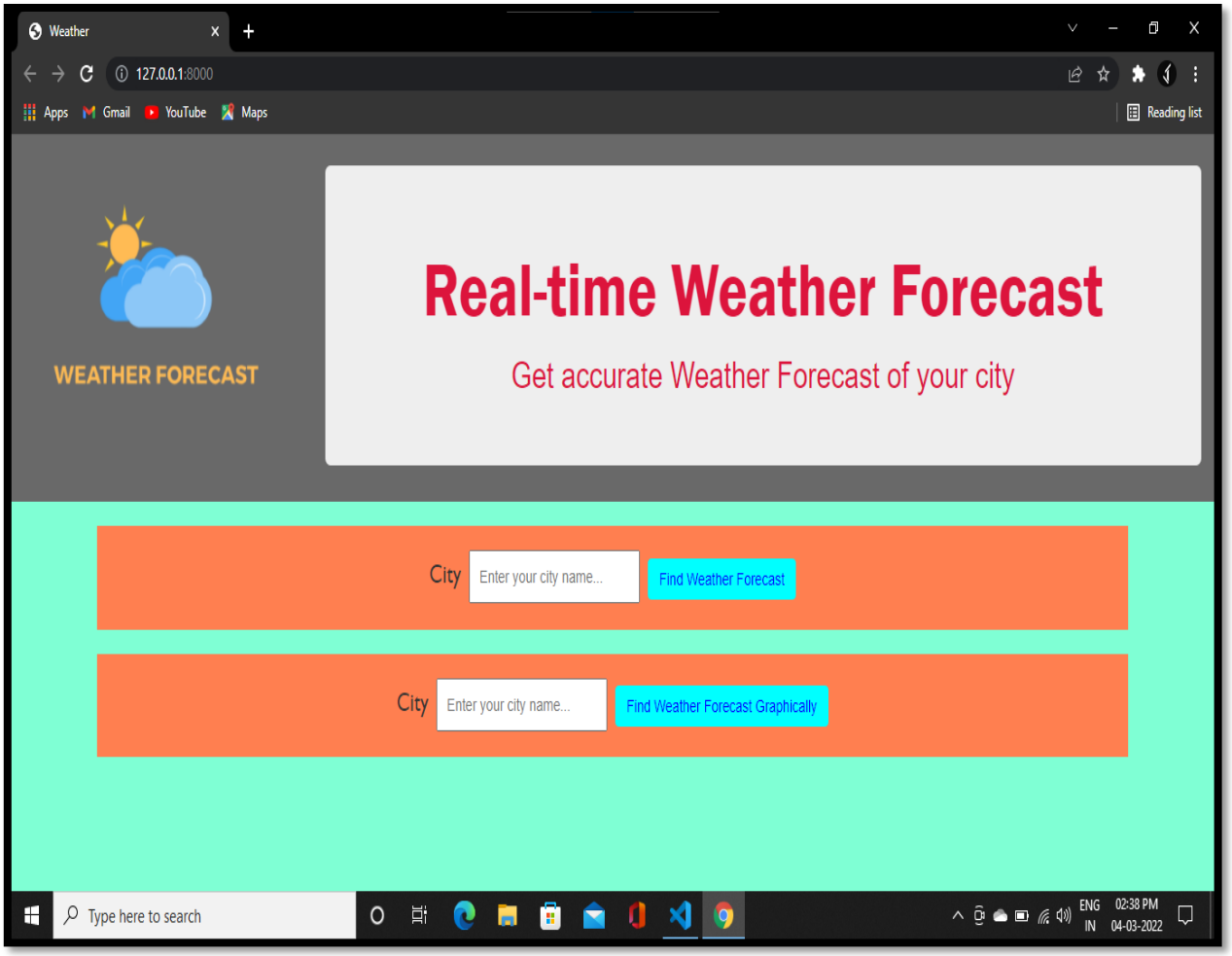

Figure 5.1 Homepage Diagram

This is the homepage of the web application of weather forecasting information. In this page you can get the accurate weather forecasting of your city. In this home module you can enter your city name and click find weather forecast or if you want to find it graphically click find weather forecast graphically.

5.2 Result Page 1

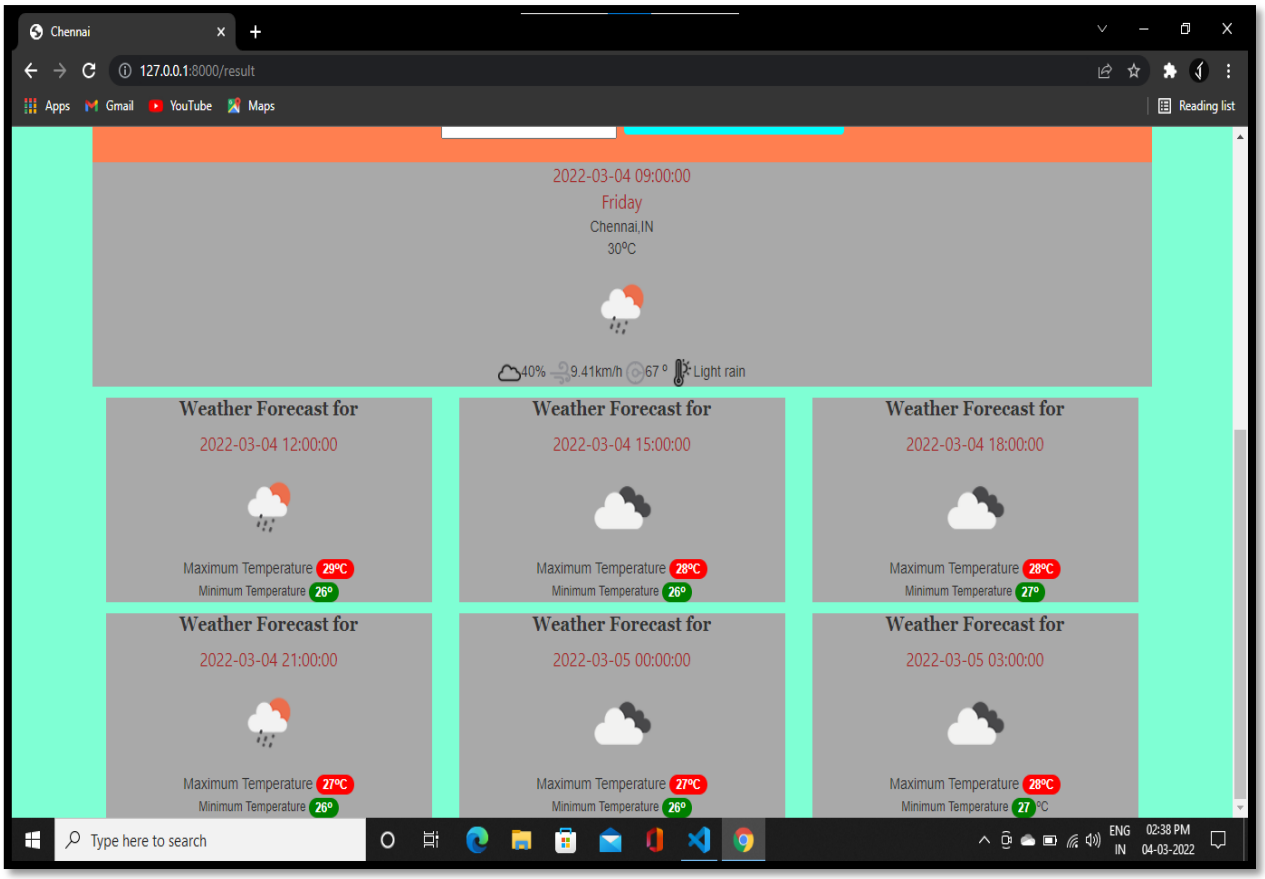

Figure 5.2 Result Page 1

When you enter the city name and find weather forecast it will show the accurate weather forecasting information of your city. It will also show you minimum temperaute, maximum temperature, cloud precipitation, wind speed, humidity and sunshine. It will give you accurate weather predicitons for every three hours.

5.3 Result Page 2

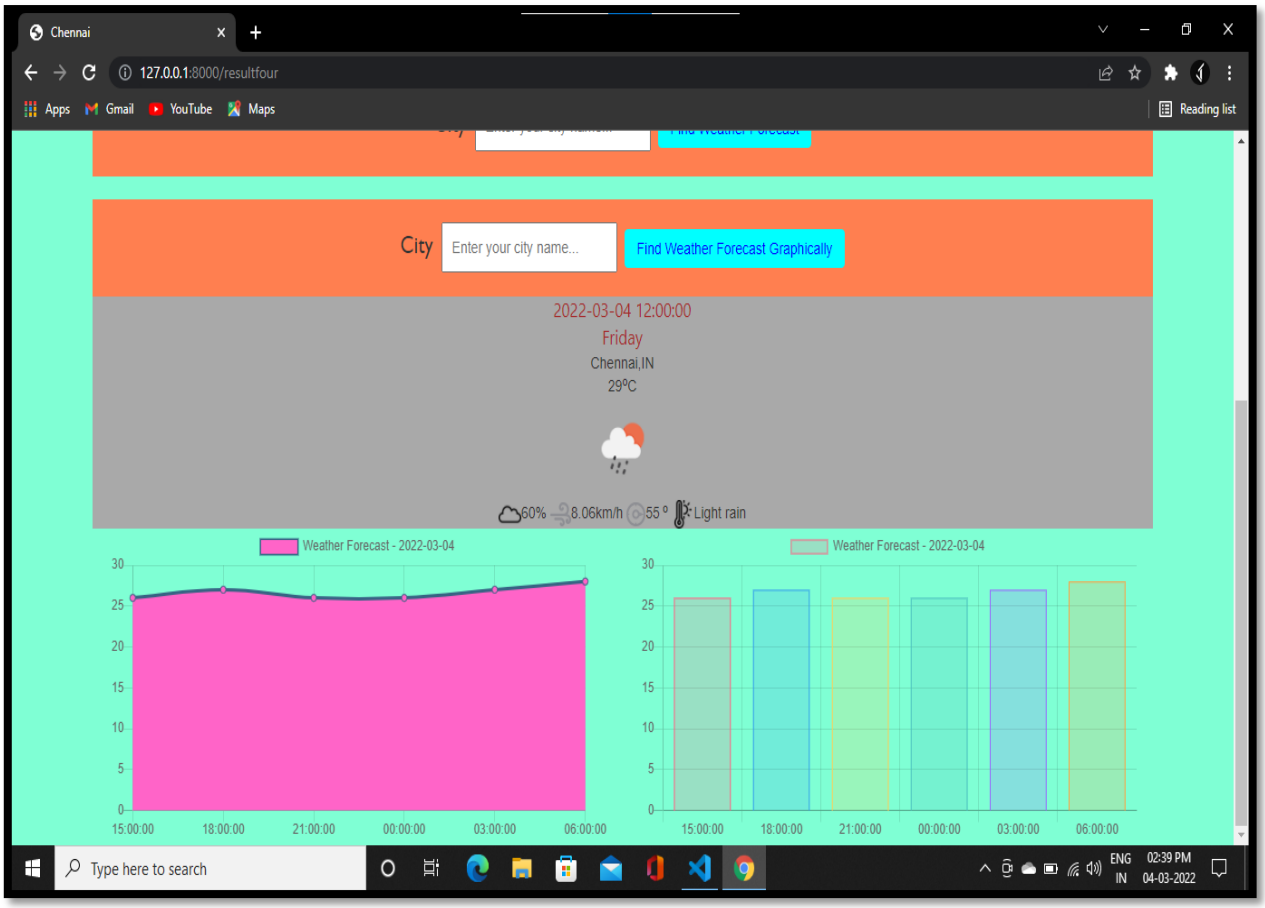

Figure 5.3 Result Page 2

In this Graphical result module you can see your weather information in graphical method. There are two types of graph one is bar graph and another one is area graph. In this two types of graph it will update weather time to time and celsius also.

CHAPTER - 6

CONCLUSION AND FUTURE ENHANCEMENTS

6.1 Conclusion

In the era of the global warming, research in weather measurement, monitoring and forecasting are become more and more relevant. This research demonstrates the design and implementation of an affordable mini weather monitoring system that ensures flexibility, portability, scability and user friendly operations which can provide data of some weather variables including temperature, humidity and pressure. With the advacement of technology weather forecasting has developed to its level best, but there is yet to develop, as far as a nature is so unpredictable. Weather forecasts are increasingly accurate and useful, and their benefits extend widely across the economy. While much has been accomplished in improving weather forecasts, there remains much room for improvement. Simultaneously, they are developing new technologies and observational netwoeks that can enchance forecaster skill and the value of their services to their users.

6.2 Future Work

The website we created in this project can be futher developed into a mobile application so that it can give timely weather updates. These updates will be received in the form of notification in the user’s mobile based on the location they are present in. So the users don’t even have to get into that particular application to know the weather and it saves their valuable time.

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APPENDIX:

```
from django.shortcuts import render, redirect
from weather.key import api_key
import requests
import math
from rest_framework.views import APIView
from rest_framework.response import Response

class ChartData(APIView):
    authentication_classes = []
    permission_classes = []

    def get(self, request, format = None):
        city_name="Chennai"
        city_name=request.GET['city'].lower()
        print(api_key)
        url =
f"http://api.openweathermap.org/data/2.5/forecast?q={city_name}&appid={api_key}"
        # print(url)
        w_dataset = requests.get(url).json()

        labels = [
                w_dataset['list'][1]["dt_txt"].split()[1],
                w_dataset['list'][2]["dt_txt"].split()[1],
                w_dataset['list'][3]["dt_txt"].split()[1],
                w_dataset['list'][4]["dt_txt"].split()[1],
                w_dataset['list'][5]["dt_txt"].split()[1],
                w_dataset['list'][6]["dt_txt"].split()[1],
            ]
        chartLabel = "Weather Forecast - " + w_dataset['list'][1]["dt_txt"].split()[0]
        chartdata = [
            math.floor(w_dataset["list"][1]["main"]["temp_min"] -273.0),
            math.floor(w_dataset["list"][2]["main"]["temp_min"] -273.0),
            math.floor(w_dataset["list"][3]["main"]["temp_min"] -273.0),
            math.floor(w_dataset["list"][4]["main"]["temp_min"] -273.0),
            math.floor(w_dataset["list"][5]["main"]["temp_min"] -273.0),
            math.floor(w_dataset["list"][6]["main"]["temp_min"] -273.0),

        ]
        data ={
                    "labels":labels,
                    "chartLabel":chartLabel,
                    "chartdata":chartdata,
             }
        return Response(data)


def index(request):
    return render(request, "home.html")

def result(request):
```

```
    if request.method == "POST":
        city_name = request.POST["city"].lower()
        # print(api_key)
        url =
f"http://api.openweathermap.org/data/2.5/forecast?q={city_name}&appid={api_key}"
        # print(url)
        w_dataset = requests.get(url).json()
        try:
            context = {
                "city_name":w_dataset["city"]["name"],
                "city_country":w_dataset["city"]["country"],
                "wind":w_dataset['list'][0]['wind']['speed'],
                "degree":w_dataset['list'][0]['wind']['deg'],
                "status":w_dataset['list'][0]['weather'][0]['description'],
                "cloud":w_dataset['list'][0]['clouds']['all'],
                'date':w_dataset['list'][0]["dt_txt"],
                'date1':w_dataset['list'][1]["dt_txt"],
                'date2':w_dataset['list'][2]["dt_txt"],
                'date3':w_dataset['list'][3]["dt_txt"],
                'date4':w_dataset['list'][4]["dt_txt"],
                'date5':w_dataset['list'][5]["dt_txt"],
                'date6':w_dataset['list'][6]["dt_txt"],


                "temp": round(w_dataset["list"][0]["main"]["temp"] -273.0),
                "temp_min1":math.floor(w_dataset["list"][1]["main"]["temp_min"] -273.0),
                "temp_max1": math.ceil(w_dataset["list"][1]["main"]["temp_max"] -273.0),
                "temp_min2":math.floor(w_dataset["list"][2]["main"]["temp_min"] -273.0),
                "temp_max2": math.ceil(w_dataset["list"][2]["main"]["temp_max"] -273.0),
                "temp_min3":math.floor(w_dataset["list"][3]["main"]["temp_min"] -273.0),
                "temp_max3": math.ceil(w_dataset["list"][3]["main"]["temp_max"] -273.0),
                "temp_min4":math.floor(w_dataset["list"][4]["main"]["temp_min"] -273.0),
                "temp_max4": math.ceil(w_dataset["list"][4]["main"]["temp_max"] -273.0),
                "temp_min5":math.floor(w_dataset["list"][5]["main"]["temp_min"] -273.0),
                "temp_max5": math.ceil(w_dataset["list"][5]["main"]["temp_max"] -273.0),
                "temp_min6":math.floor(w_dataset["list"][6]["main"]["temp_min"] -273.0),
                "temp_max6": math.ceil(w_dataset["list"][6]["main"]["temp_max"] -273.0),


                "pressure":w_dataset["list"][0]["main"]["pressure"],
                "humidity":w_dataset["list"][0]["main"]["humidity"],
                "sea_level":w_dataset["list"][0]["main"]["sea_level"],


                "weather":w_dataset["list"][1]["weather"][0]["main"],
                "description":w_dataset["list"][1]["weather"][0]["description"],
                "icon":w_dataset["list"][0]["weather"][0]["icon"],
                "icon1":w_dataset["list"][1]["weather"][0]["icon"],
                "icon2":w_dataset["list"][2]["weather"][0]["icon"],
                "icon3":w_dataset["list"][3]["weather"][0]["icon"],
                "icon4":w_dataset["list"][4]["weather"][0]["icon"],
```

```
            "icon5":w_dataset["list"][5]["weather"][0]["icon"],
            "icon6":w_dataset["list"][6]["weather"][0]["icon"],

        }
    except:
        context = {

        "city_name":"Enter City not Found.... Try Again..."
    }

    return render(request, "results.html", context)
else:
      return redirect('home')



def resultfour(request):
    if request.method == "POST":
        city_name = request.POST["city"].lower()
        # print(api_key)
        url =
f"http://api.openweathermap.org/data/2.5/forecast?q={city_name}&appid={api_key}&cnt
=96"
        print(url)
        w_dataset = requests.get(url).json()
        #print(w_dataset)
        # print(w_dataset['list'])
        print(len(w_dataset['list']))
        try:
            context = {
                "city_name":w_dataset["city"]["name"],
                "city_country":w_dataset["city"]["country"],
                "wind":w_dataset['list'][0]['wind']['speed'],
                "degree":w_dataset['list'][0]['wind']['deg'],
                "status":w_dataset['list'][0]['weather'][0]['description'],
                "cloud":w_dataset['list'][0]['clouds']['all'],
                'date':w_dataset['list'][0]["dt_txt"],
                'date1':w_dataset['list'][25]["dt_txt"],
                'date2':w_dataset['list'][25]["dt_txt"],
                'date3':w_dataset['list'][25]["dt_txt"],
                'date4':w_dataset['list'][25]["dt_txt"],
                'date5':w_dataset['list'][28]["dt_txt"],
                'date6':w_dataset['list'][25]["dt_txt"],



                "temp": round(w_dataset["list"][0]["main"]["temp"] -273.0),
                "temp_min1":math.floor(w_dataset["list"][1]["main"]["temp_min"] -273.0),
                "temp_max1": math.ceil(w_dataset["list"][1]["main"]["temp_max"] -273.0),
                "temp_min2":math.floor(w_dataset["list"][2]["main"]["temp_min"] -273.0),
                "temp_max2": math.ceil(w_dataset["list"][2]["main"]["temp_max"] -273.0),
```

```
            "temp_min3":math.floor(w_dataset["list"][3]["main"]["temp_min"] -273.0),
            "temp_max3": math.ceil(w_dataset["list"][3]["main"]["temp_max"] -273.0),
            "temp_min4":math.floor(w_dataset["list"][4]["main"]["temp_min"] -273.0),
            "temp_max4": math.ceil(w_dataset["list"][4]["main"]["temp_max"] -273.0),
            "temp_min5":math.floor(w_dataset["list"][5]["main"]["temp_min"] -273.0),
            "temp_max5": math.ceil(w_dataset["list"][5]["main"]["temp_max"] -273.0),
            "temp_min6":math.floor(w_dataset["list"][6]["main"]["temp_min"] -273.0),
            "temp_max6": math.ceil(w_dataset["list"][6]["main"]["temp_max"] -273.0),


            "pressure":w_dataset["list"][0]["main"]["pressure"],
            "humidity":w_dataset["list"][0]["main"]["humidity"],
            "sea_level":w_dataset["list"][0]["main"]["sea_level"],


            "weather":w_dataset["list"][1]["weather"][0]["main"],
            "description":w_dataset["list"][1]["weather"][0]["description"],
            "icon":w_dataset["list"][0]["weather"][0]["icon"],
            "icon1":w_dataset["list"][1]["weather"][0]["icon"],
            "icon2":w_dataset["list"][2]["weather"][0]["icon"],
            "icon3":w_dataset["list"][3]["weather"][0]["icon"],
            "icon4":w_dataset["list"][4]["weather"][0]["icon"],
            "icon5":w_dataset["list"][5]["weather"][0]["icon"],
            "icon6":w_dataset["list"][6]["weather"][0]["icon"],

        }
    except:
        context = {

        "city_name":"Enter City not Found.... Try Again..."
    }

    return render(request, "results4.html", context)
else:
      return redirect('home')
```