WEATHER FORECASTING USING AI

A Project Report
Submitted in the partial fulfillment of the
requirements for the award of the degree of

BACHELOR OF TECHNOLOGY

In

DEPARTMENT OF COMPUTER SCIENCE ENGINNERING

By

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DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Declaration

The Project Report entitled "**Weather Forecasting Using AI** "is a record of Bonafide Work of **Siripuri Divya- 457788, P. Venkateswara Rao -XXXXXXX,team members U.Chandrahas- 2320030041**, **J.Yashwanth- 2320030388, I.Chaitanya Prakash-2320030396** submitted in partial fulfillment for the award of B. Tech in Computer Engineering to the K L University. The results embodied in this report have not been copied from any other departments/University/Institute.

Siripuri Divya - 457788

K L (Deemed to be) University

DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

Certificate

This is certify that the project based report entitled "**Weather Forecasting Using AI**" is a bonafide work done and submitted by **S.Divya (458999), P. Venkateswara Rao, team members U.Chandrahas-2320030041**,**J.Yashwanth-2320030388,I.ChaitanyaPrakash-2320030396** in partial fulfillment of the requirements for the award of the degree of **BACHELOR OF TECHNOLOGY** in Department of Computer Science Engineering, K L (Deemed to be University), during the academic year **2024-2025.**

Signature of the Supervisor

Signature of the HOD

Signature of the External Examiner

ACKNOWLEDGEMENT

The success in this project would not have been possible but for the timely help and guidance rendered by many people. Our wish to express my sincere thanks to all those who has assisted us in one way or the other for the completion of my project.

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We thank all the members of teaching and non-teaching staff members, and also who have assisted me directly or indirectly for successful completion of this project. Finally, I sincerely thank my parents, friends and classmates for their kind help and cooperation during my work.

S.Divya - 4567889

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ABSTRACT

This project leverages Artificial Intelligence to enhance weather forecasting accuracy by analyzing historical data, satellite imagery, and real-time sensor inputs. Machine learning models predict temperature, rainfall, and extreme weather events, enabling timely alerts. The AI-driven system improves decision-making for agriculture, disaster management, and public safety through reliable weather predictions.

INTRODUCTION

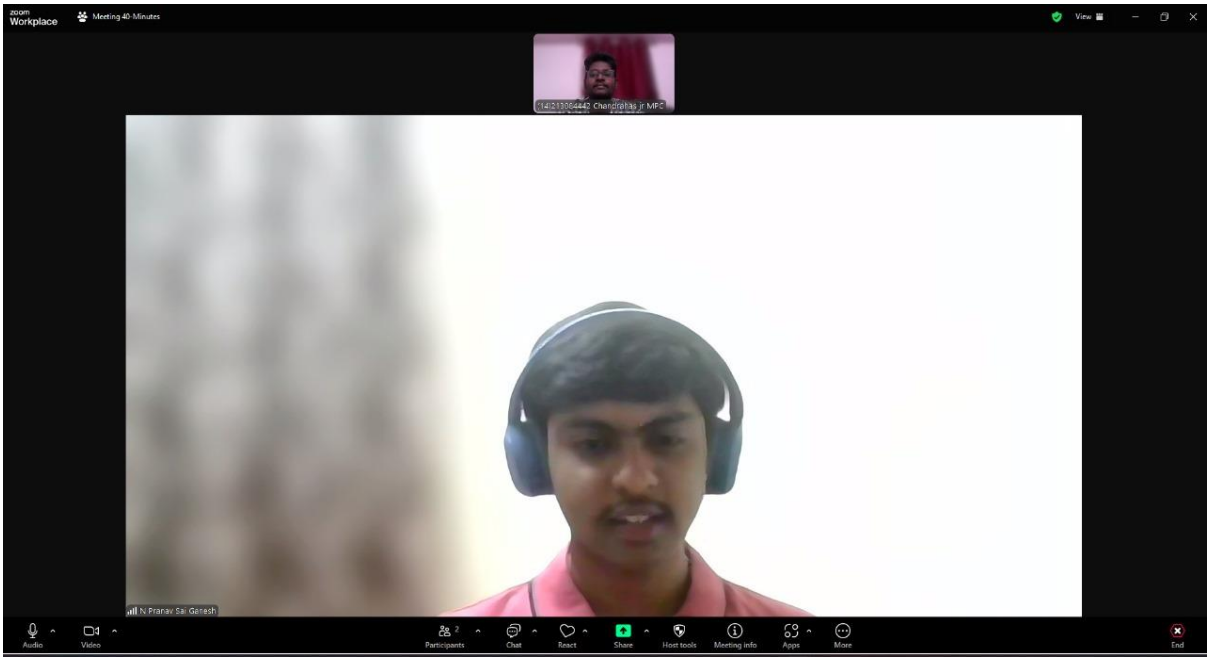
This project explores weather forecasting using Artificial Intelligence to enhance prediction accuracy. By leveraging machine learning algorithms and historical weather data, it aims to forecast temperature, humidity, and rainfall patterns. The AI-driven system improves efficiency, supports real-time analysis, and assists in better planning for agriculture, disaster management, and daily activities.

Literature survey

A literature survey on weather forecasting using AI reveals the growing use of machine learning models like neural networks, decision trees, and support vector machines for accurate predictions. Studies highlight improved forecasting accuracy, real-time data processing, and integration with satellite and sensor data, enabling better disaster preparedness and climate modeling**.**

Client meetings

Geo tag photos:




GPS Map Camera
Hyderabad, Telangana, India
Gcw2+rjm, Chaitanya College Rd, Kavya Avenue, Ameenpur, Bachupally, Hyderabad, Telangana 500090, India
Lat 17.54692° Long 78.401583°
16/03/2025 05:28 PM GMT +05:30
Google


GPS Map Camera
Hyderabad, Telangana, India
1417, Pragathi Nagar Rd, Pragathi Nagar, Hyderabad,
Telangana 500090, India
Lat 17.521795° Long 78.394885°
28/02/2025 04:54 PM GMT +05:30
Google

Hardware and Software requirements

Hardware:

Processor: AMD Ryzen 7

RAM: 16 GB Max

Storage: 256 GB SSD Max

GPU: NVIDIA GPU

Internet: Stable connection for real-time data access

Software:

Operating System: Windows 11

Programming Language: Python 3

Libraries:

1. NumPy, Pandas, Matplotlib
2. Scikit-learn
3. TensorFlow
4. Development Tools: ,VS Code
5. Database (optional): MySQL and PostgreSQL
6. APIs: Weather APIs for real-time data

Implementation

This AI-based weather forecasting project uses historical weather data and machine learning algorithms to predict future weather conditions. It employs techniques like regression, time series analysis, and neural networks to analyze patterns in temperature, humidity, and pressure, enabling accurate short-term and long-term forecasts for various geographic regions.

Experimentation and Code

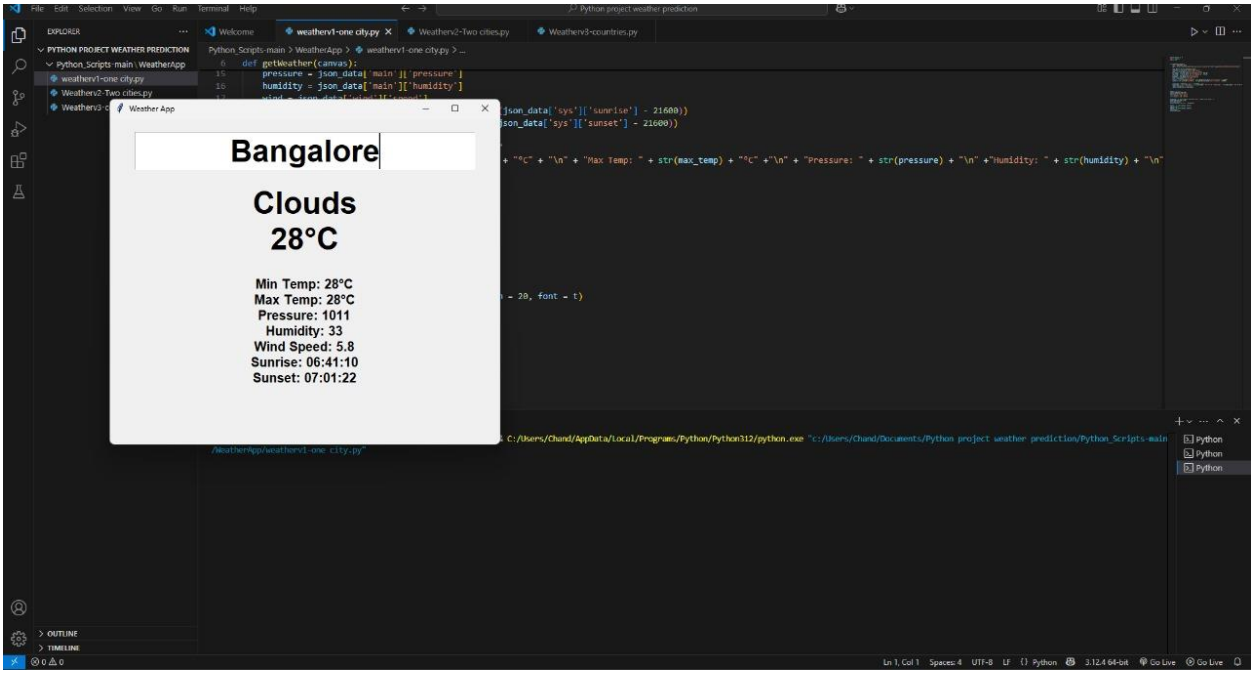
```python
import tkinter as tk
from tkinter import ttk, messagebox
import requests
import time

# Global API key and URL
API_KEY = "06c921750b9a82d8f5d1294e1586276f"
BASE_URL = "https://api.openweathermap.org/data/2.5/weather"

class WeatherFrame(ttk.Frame):
    """
    A frame that handles weather fetching and displaying for one country.
    """
    def __init__(self, parent, country_number, *args, **kwargs):
        super().__init__(parent, *args, **kwargs)
        self.country_number = country_number
        self.create_widgets()

    def create_widgets(self):
        # Instruction label
        instruction = f"Enter Country {self.country_number} (or its capital/major city):"
        self.label_instruction = ttk.Label(self, text=instruction, font=("Poppins", 15, "bold"))
        self.label_instruction.grid(row=0, column=0, columnspan=2, pady=(10, 5), sticky="w")

        # Entry widget for country name
        self.entry_country = ttk.Entry(self, width=25, font=("Poppins", 14))
        self.entry_country.grid(row=1, column=0, padx=10, pady=5)
        self.entry_country.bind('<Return>', self.get_weather)
```

```python
import tkinter as tk
import requests
import time

# Function to fetch and display weather for the first city
def getWeather(event=None):
    city = textField.get()
    api = "https://api.openweathermap.org/data/2.5/weather?q=" + city + "&appid=06c921750b9a82d8f5d1294e1586276f"

    json_data = requests.get(api).json()
    condition = json_data['weather'][0]['main']
    temp = int(json_data['main']['temp'] - 273.15)
    min_temp = int(json_data['main']['temp_min'] - 273.15)
    max_temp = int(json_data['main']['temp_max'] - 273.15)
    pressure = json_data['main']['pressure']
    humidity = json_data['main']['humidity']
    wind = json_data['wind']['speed']
    sunrise = time.strftime('%I:%M:%S', time.gmtime(json_data['sys']['sunrise'] - 21600))
    sunset = time.strftime('%I:%M:%S', time.gmtime(json_data['sys']['sunset'] - 21600))

    final_info = condition + "\n" + str(temp) + "°C"
    final_data = (
        "\nMin Temp: " + str(min_temp) + "°C" + "\n" +
        "Max Temp: " + str(max_temp) + "°C" + "\n" +
        "Pressure: " + str(pressure) + "\n" +
        "Humidity: " + str(humidity) + "\n" +
        "Wind Speed: " + str(wind) + "\n" +
        "Sunrise: " + sunrise + "\n" +
        "Sunset: " + sunset
    )
```

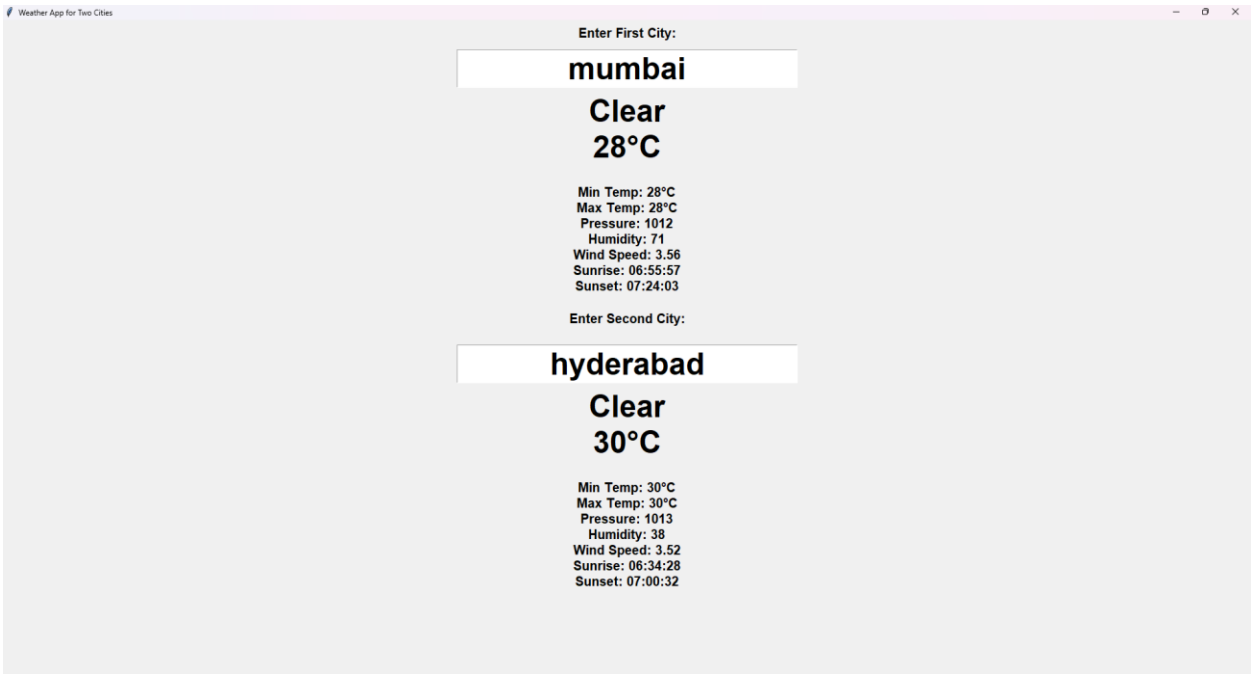
```python
import tkinter as tk
import requests
import time


def getWeather(canvas):
    city = textField.get()
    api = "https://api.openweathermap.org/data/2.5/weather?q="+city+"&appid=06c921750b9a82d8f5d1294e1586276f"

    json_data = requests.get(api).json()
    condition = json_data['weather'][0]['main']
    temp = int(json_data['main']['temp'] - 273.15)
    min_temp = int(json_data['main']['temp_min'] - 273.15)
    max_temp = int(json_data['main']['temp_max'] - 273.15)
    pressure = json_data['main']['pressure']
    humidity = json_data['main']['humidity']
    wind = json_data['wind']['speed']
    sunrise = time.strftime('%I:%M:%S', time.gmtime(json_data['sys']['sunrise'] - 21600))
    sunset = time.strftime('%I:%M:%S', time.gmtime(json_data['sys']['sunset'] - 21600))

    final_info = condition + "\n" + str(temp) + "°C"
    final_data = "\n"+ "Min Temp: " + str(min_temp) + "°C" + "\n" + "Max Temp: " + str(max_temp) + "°C" +"\n" + "Pressure: 
    label1.config(text = final_info)
    label2.config(text = final_data)


canvas = tk.Tk()
canvas.geometry("600x500")
canvas.title("Weather App")
f = ("poppins", 15, "bold")
```

Results

For One City:



For Two Cities:



For Different Countries And cities:

Conclusion

The AI-based weather forecasting project demonstrates improved accuracy and efficiency over traditional methods. By leveraging machine learning algorithms and historical data, it enables precise predictions, aiding disaster preparedness and daily planning. This approach marks a significant advancement in meteorology, offering scalable, real-time solutions for diverse geographical and climatic conditions.

References

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3. Dueben, P. D., & Bauer, P. (2018). "Challenges and design choices for global weather and climate models based on machine learning."

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