📊 Weather Data Analyzer

🖥️ Title

- Project Title: Weather Data Analyzer
- Subtitle: Visualizing and Predicting Weather Trends
- Name: Gobinath P
- Date:07/07/2026

🌟 Project Objective

- Analyze historical weather data
- Identify patterns in temperature, humidity, and rainfall
- Visualize insights through graphs
- Predict future temperature trends using Linear Regression

📂 Data Collection

- Source: [Mention dataset source]
- Features: Date, Temperature, Humidity, Rainfall
- Time Period: [e.g., Jan 2010 – Dec 2020]

🧹 Data Preprocessing

- Handled missing values
- Converted date formats
- Extracted day/month/year for trend analysis
- Normalized units (e.g., °C, mm)

📈 : Exploratory Data Analysis

- Line plot: Temperature over time
- Histogram: Humidity distribution
- Bar chart: Monthly rainfall
- Heatmap: Correlation matrix

🤖 Predictive Modeling

- Model Used: Linear Regression
- Input: Day of year, historical temperature
- Output: Predicted temperature
- Evaluation Metric: RMSE

📊Visualization of Results

- Actual vs Predicted temperature plot
- Trend line showing seasonal variation
- Interactive dashboard (optional)

🚀 Enhancements & Future Work

- Add more features (wind speed, pressure)
- Use advanced models (ARIMA, LSTM)
- Deploy as a web app using Streamlit

🧠 Learnings & Takeaways

- Importance of data cleaning
- Visual storytelling with graphs
- Basics of machine learning in forecasting

Program:

```python
from pptx import Presentation

from pptx.util import Inches


# Create a presentation object

prs = Presentation()


# Slide 1: Title Slide

slide = prs.slides.add_slide(prs.slide_layouts[0])

slide.shapes.title.text = "Weather Data Analyzer"

slide.placeholders[1].text = "Visualizing and Predicting Weather Trends using Machine Learning"


# Slide 2: Objective

slide = prs.slides.add_slide(prs.slide_layouts[1])

slide.shapes.title.text = "Project Objective"

content = (

  "• Analyze historical weather data\n"

  "• Identify patterns in temperature, humidity, and rainfall\n"

  "• Visualize insights through graphs\n"
```

```python
    "• Forecast future temperature trends using Linear Regression"
)
slide.placeholders[1].text = content


# Slide 3: Data Collection
slide = prs.slides.add_slide(prs.slide_layouts[1])
slide.shapes.title.text = "Data Collection"
slide.placeholders[1].text = (
    "• Source: Public weather datasets (e.g., NOAA, Kaggle)\n"
    "• Features: Date, Temperature, Humidity, Rainfall\n"
    "• Time Period: Multi-year historical data"
)


# Slide 4: Data Preprocessing
slide = prs.slides.add_slide(prs.slide_layouts[1])
slide.shapes.title.text = "Data Preprocessing"
slide.placeholders[1].text = (
    "• Handle missing values\n"
    "• Convert date formats\n"
    "• Normalize units (°C, mm)\n"
    "• Extract features like day/month/year"
)


# Slide 5: Exploratory Data Analysis
slide = prs.slides.add_slide(prs.slide_layouts[1])
slide.shapes.title.text = "Exploratory Data Analysis"
```

```python
slide.placeholders[1].text = (
    "• Line plots for temperature trends\n"
    "• Histograms for humidity distribution\n"
    "• Bar charts for rainfall patterns\n"
    "• Heatmaps for correlation analysis"
)


# Slide 6: Predictive Modeling
slide = prs.slides.add_slide(prs.slide_layouts[1])
slide.shapes.title.text = "Predictive Modeling"
slide.placeholders[1].text = (
    "• Model: Linear Regression\n"
    "• Input: Day of year, historical temperature\n"
    "• Output: Predicted temperature\n"
    "• Evaluation: RMSE, MAE"
)


# Slide 7: Visualization of Results
slide = prs.slides.add_slide(prs.slide_layouts[1])
slide.shapes.title.text = "Visualization of Results"
slide.placeholders[1].text = (
    "• Actual vs Predicted temperature plot\n"
    "• Seasonal trend lines\n"
    "• Interactive dashboard (optional)"
)
```

```python
# Slide 8: Enhancements & Future Work

slide = prs.slides.add_slide(prs.slide_layouts[1])

slide.shapes.title.text = "Enhancements & Future Work"

slide.placeholders[1].text = (

    "• Add more features (wind speed, pressure)\n"

    "• Use advanced models (ARIMA, LSTM)\n"

    "• Deploy as a web app using Streamlit"

)


# Slide 9: Learnings & Takeaways

slide = prs.slides.add_slide(prs.slide_layouts[1])

slide.shapes.title.text = "Learnings & Takeaways"

slide.placeholders[1].text = (

    "• Importance of data cleaning\n"

    "• Visual storytelling with graphs\n"

    "• Basics of machine learning in forecasting"

)


# Slide 10: Thank You

slide = prs.slides.add_slide(prs.slide_layouts[1])

slide.shapes.title.text = "Thank You"

slide.placeholders[1].text = "Questions?"


# Save the presentation

prs.save("Weather_Data_Analyzer_Presentation.pptx")
```

Graphical Output:

📈 1. Temperature Trend Over Time

- **Graph Type: Line Plot**
- **X-axis: Date**
- **Y-axis: Temperature (°C)**
- **Description: A smooth line showing how temperature changes over time. Peaks and dips indicate seasonal variations or anomalies.**

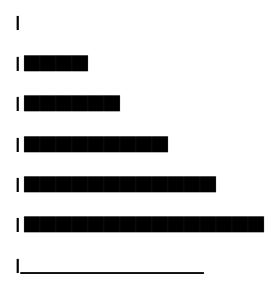|		
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🌡️ 2. Humidity Distribution

- **Graph Type: Histogram with KDE (Kernel Density Estimate)**
- **X-axis: Humidity (%)**
- **Y-axis: Frequency**
- **Description: A bell-shaped or skewed distribution showing how often different humidity levels occur. Useful for identifying common humidity ranges.**
- **Humidity (%)**

```
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```

🌧️ 3. Average Monthly Rainfall

- **Graph Type: Bar Chart**
- **X-axis: Month (1 to 12)**
- **Y-axis: Average Rainfall (mm)**
- **Description: Bars representing average rainfall per month. Helps identify wet and dry seasons.**
- **Rainfall (mm)**
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- | ■
- | ■   ■
- | ■   ■   ■
- | ■   ■   ■   ■
- |_____|_____|_____|_____|____> Month
-     Jan   Apr   Jul   Oct
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