

Weather Forecast & Historical Analysis

Shashi Yadau | Data Analytics Project

Problem Statement

- Understand climate patterns across Indian state capitals.
 - Analyze long-term weather trends using historical data.
 - Forecast future weather conditions using live API data.
 - Visualize insights using interactive Power BI dashboards.
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Data Sources

- Open-Meteo API for Forecast & Historical Data
- Geolocation API for Capital Coordinates
- Indian Capitals Dataset (CSV with lat/lon)



Tools I Used for Analysis

- Python (Jupyter Notebook in PyCharm)
 - Libraries: Pandas, Requests, Requests-Cache, Retry
 - Power BI for data visualization and dashboards
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Data Collection & Processing

- Fetched daily weather data from 1980– 2025(June) for all capitals.
 - Used retry logic to handle API rate limits and errors.
 - Cleaned, merged, and structured data for visualization.
 - Stored datasets for forecast and historical analysis separately.
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Power BI Visualizations

- Geographical Representation of monthly rainfall patterns across states.
 - Line charts showing temperature trends over decades.
 - Interactive filters by State and City.
 - Filled map to display geographic weather comparisons.
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Insights & Findings

- Sikkim, Meghalaya, and Assam received the highest recorded rainfall.
 - Steady temperature rise in many regions like Lucknow, Raipur, and Jaipur.
 - Distinct seasonal patterns observed in rainfall.
 - Forecast vs Historic comparison enables deeper predictions.
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Challenges & Solutions

- API rate limits handled using retry + time delays.
 - Duplicates resolved using city + state composite keys.
 - Power BI formatting issues resolved with sorting and DAX.
 - Mapped city names to coordinates to resolve missing data.
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Conclusion & Next Steps

- Combined API, Python & Power BI to build a complete system.
 - Plan to automate daily updates to the dashboard.
 - Will explore machine learning for predictive insights.
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Thank You

- I will be very pleased if I get feedback on how to improve my project
- If I made a mistake, please point it out. It will be invaluable for me.