Weather Pulse Dashboard

Monitor Weather, Forecasts, and AQI Effortlessly

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Weather Pulse Dashboard

1. Overview

In order to help people and organizations plan outdoor activities, the Weather Pulse Dashboard is an interactive Power BI dashboard that shows current weather conditions, air quality, and weekly forecasts activities and effectively keeping an eye on the environment. With a simple, dark-themed design, it is meant for weather enthusiasts, professionals, students, and agencies that require fast weather insights.

2. Data Sources

- **Source**: Weather and air quality API.
- **Refresh Frequency**: Daily or live refresh depending on the API.
- **Fields Used :-**
- Temperature (current & forecast)
- Humidity
- Wind Speed
- Visibility
- Air Pressure
- UV Index
- Precipitation
- Air Quality Index (O3, SO2, CO, NO2, PM2.5, PM10)
- Sunrise and Sunset times

- Chances of Rain (daily)

3. Data Extraction Using WeatherAPI

The weather data for this dashboard was extracted using https://www.weatherapi.com, which offers a free trial (used until 25 July) for live weather and forecast data retrieval.

API Details:

- **Endpoint:** Current weather, forecast, and air quality data endpoints.
- **Key Parameters:** Location (city name), number of forecast days (7 Days), AQI flag for air quality data.
- **Integration with Power BI:**
  - Used Power Query's Web connector to call the API with the provided API key.
  - Data was retrieved in JSON format and converted into tabular format using Power Query.
- **Rate Limits:** Free tier allowed limited calls per day optimized refresh intervals to remain within limits.
- **Error Handling:** Implemented checks for null values and backup fallback using the last retrieved dataset to prevent dashboard blanking during API downtimes.

4. Data Modeling

- A single weather data table, optionally connected to a date dimension for trend analysis.
- Measures created using DAX for:
- Current metrics display
- Weekly average/forecast calculations
- AQI categorization (e.g., Unhealthy for Sensitive Groups)
- Rain percentage formatting

5. Dashboard Layout & Design

Theme: Dark mode with gradient highlights for weather cards and clean white typography for readability.

Layout: -

Top Left: City selection, current temperature, weather condition. -

Top Right: Sunrise and Sunset timing.

Center: Weekly forecast with line chart.

Right: Chances of rain (bar charts).

Bottom Left: Key weather metrics (Humidity, Wind Speed, Visibility, Pressure, UV Index, Precipitation).

Bottom Center: Air Quality Index with gauge and pollutant breakdown. Visual balance, clear iconography, and a modern UI ensure an engaging user experience.

6. Visual Components

- **Cards**: For current temperature, humidity, wind speed, visibility, pressure, UV index, and precipitation.
- **Line Chart**: Weekly forecast temperatures.
- **Bar Charts**: Daily chances of rain with conditional color coding.
- **Donut Chart**: Air Quality Index category.
- **Text Boxes**: Sunrise and Sunset times.
- **Slicer**: City selection (Chennai, Gurgaon, Lucknow and many more).
- Tooltips are customized to provide detailed values on hover for each metric

7. Interactive Features

- Dynamic city selection using slicers to update all visuals.
- Hover tooltips for precise weather and AQI data.
- Interactive visuals for deeper analysis of daily weather and rain probabilities.

8. Key Insights Provided

- Real-time weather monitoring for selected cities.
- Weekly temperature and rain probability trends.
- Air Quality monitoring with health guidance for sensitive groups.
- Sunrise and Sunset timing for daily activity planning.

9. Challenges Faced & Solutions

- **Data Refresh Issues**: Addressed using scheduled refresh and API validation.

- **Visual Overload**: Mitigated using dark themes and focused card visuals.
- **Performance Optimization**: Leveraged DAX for measure calculations instead of calculated columns.
- **Data Gaps**: Filled using rolling averages or API backup data.

10. Future Enhancements

- Addition of historical trend analysis for temperatures and AQI.
- Radar imagery for real-time cloud coverage.
- Mobile-friendly Power BI view with notification support.
- Global city search and live data integration.

11. Conclusion

The Weather Pulse Dashboard provides a comprehensive, visually engaging, and practical approach to monitoring weather and air quality for daily and weekly planning. This dashboard can be showcased in your portfolio, used for academic projects, or shared with weather agencies to demonstrate live data analysis capabilities using Power BI.