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Motor log DASHBOARD

Utilizing Power BI to create A weather DASHBOARD

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Introduction

1. **Power BI**: Power BI is a business analytics tool developed by Microsoft. It allows users to visualize data, share insights across an organization, and embed analytics into applications. Power BI can connect to various data sources, transform data, and create interactive dashboards and reports. It's widely used for data-driven decision making in businesses of all sizes.
2. **Azure Functions** is a serverless compute service offered by Microsoft Azure that enables developers to run code in response to events without managing infrastructure. It supports multiple programming languages and integrates seamlessly with other Azure services. Azure Functions automatically scales to meet demand, and users only pay for the compute time they consume. This service is ideal for processing data, integrating systems, working with IoT, and building simple APIs. Its event-driven architecture makes it suitable for tasks that require quick execution in response to triggers, such as changes in database records, incoming HTTP requests, or messages from other Azure services.
3. **APIs (Application Programming Interfaces)** are sets of protocols, routines, and tools for building software applications. They specify how software components should interact, allowing different applications to communicate with each other. APIs can be thought of as contracts between different software programs, defining the types of requests and data exchanges that can be made. They are crucial in modern software development, enabling developers to integrate diverse systems, access third-party services, and create modular, scalable applications. APIs can be designed for internal use within an organization, or they can be made public, allowing external developers to interact with a company's services or data in a controlled manner.

Objectives

1. Data Collection and Processing:

- Set up Azure Function to fetch daily weather data from a reliable API

- Process and structure the data for dashboard display

- Store processed data in a suitable database or storage solution

2. Dashboard Layout:

- Create a matrix layout with time slots on the x-axis and weekdays on the y-axis

- Implement responsive design for various screen sizes

3. Visual Representation:

- Display weather patterns using appropriate icons or images in each matrix cell

- Ensure images are clear and representative of the weather condition

4. Interactive Features:

- Implement hover functionality to show tooltips

- Display detailed weather information in tooltips, including:

\* Temperature

\* Feels-like temperature

\* Chance of rain

\* Amount of rain

\* Wind speed

5. Data Update Mechanism:

- Configure Azure Function to run daily for data updates

- Implement logic to refresh dashboard data without page reload

6. User Interface:

- Design an intuitive and visually appealing interface

- Include any necessary controls (e.g., location selection, date range)

7. Performance Optimization:

- Optimize image loading and display for smooth user experience

- Implement efficient data retrieval and rendering techniques

8. Testing and Quality Assurance:

- Conduct thorough testing of all features and interactions

- Ensure accuracy of displayed weather data

- Test across different browsers and devices

9. Deployment and Maintenance:

- Deploy the dashboard to a suitable hosting platform

- Set up monitoring for the Azure Function and dashboard performance

- Plan for regular maintenance and updates

10. Documentation:

- Create user guide for dashboard interaction

- Document technical details for future maintenance and upgrades

Tasks and Observations

Task 1: Data collection with the help of APIs

The initial task was to research and find a proper API which can provide the required data for locations in Australia. Open Weather is a good API which provides a free service to obtain the required weather data [Openweather](https://openweathermap.org/forecast5#list). An account is created and a new API key is made .

This Api provides 3 hour data on various weather aspects for a forecast of 5 days, the main input required is the latitude and longitude of the location.

The latitude and longitude can be found with this resource called [mapquest](https://developer.mapquest.com/documentation/tools/latitude-longitude-finder/) which provides worldwide latitude and longitude data given the address. The response of the API can be Json or Xml , I am going with JSON for ease of use and compatibility with pandas.

Task 2: API Data cleaning with Pandas

The data is pulled in the form of JSON , the code used for that operation is here.

A computer screen shot of a black screen

Description automatically generated

This step is followed by data cleaning done to convert the file into csv format, the steps can been seen from the GitHub .[repo](https://github.com/alkrona/weather-app).

Useful resources involve

using lambda functions with dataframes [link](https://www.projectpro.io/article/pandas-apply-lambda/951#:~:text=You%20can%20apply%20Lambda%20functions,results%20of%20the%20lambda%20function.).

Transforming df columns with apply [link](https://www.geeksforgeeks.org/applying-lambda-functions-to-pandas-dataframe/) [link2](https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.apply.html)

Deepcopies in pandas [link](https://pandas.pydata.org/docs/reference/api/pandas.DataFrame.copy.html)

Appending dfs with the concat function [link](https://stackoverflow.com/questions/70837397/good-alternative-to-pandas-append-method-now-that-it-is-being-deprecated)

Moreover for the purpose of modelling, another excel is created which has access to the different weather conditions and png images showcasing the images the source was copied from this [site](https://openweathermap.org/weather-conditions#Weather-Condition-Codes-2).

Task 3 : Data modelling

Task 4: Visual design

Task 5: Dashboard sharing and post development plan.

Data Resources

[Excel Sheet](https://docs.google.com/spreadsheets/d/1FT2eVwX4GF1rFyrj3QFrXBSLD4qoWh4Mf0IcN0DjRIY/edit?usp=sharing)

References