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1. Introduction

This report provides an overview of the interactive Weather Dashboard created in Excel. The primary objective of the dashboard is to enable the users to dynamically explore data through an intuitive and interactive interface. With the leverage of Excel's built-in features such as Pivot Tables, Slicers, Data validation, Charts, Formulas, and Conditional formatting, this dashboard provides meaningful insights about Weather data. The dashboard is designed to allow users to analyse daily and monthly details using these features.

The report outlines the key design choices made during development, implementation steps, highlights the main components of the dashboard, discusses challenges and limitations faced, and proposes future improvements.

2. Dashboard Overview

2.1 Design and Layout

The dashboard is structured into three primary sections:

- **Daily Details Section:** Allows users to select a specific day from a drop-down list and view relevant data points. This section provides quick access to particular data for a chosen day, ensuring that users can view specific information without manually filtering through large datasets.
- **Monthly Details Section:** Provides aggregated monthly statistics with interactive slicers for filtering data. This section enables users to analyse trends over an entire month, facilitating a more comprehensive understanding of patterns and fluctuations in the data.
- **Visualizations Section:** Features charts and graphs to represent trends dynamically.

The design emphasises clarity and ease of use, ensuring that users can quickly extract insights without requiring advanced Excel knowledge. The combination of tables, charts, and interactive elements makes data exploration clear to view. The layout follows a logical flow, guiding users from detailed daily insights to broader monthly trends, and finally to visual representations that provide a summary of key metrics.

2.2 Key Functionalities

The dashboard integrates several core functionalities:

- **Pivot Tables:** Used to summarise and analyse large datasets dynamically, updating monthly data. These tables allow for quick aggregation of information, ensuring that summaries are easily accessible.
- **Data Validation (Drop-down List):** Enables users to select a day and view corresponding data in the “Daily Details” section. It ensures a user-friendly experience where users can effortlessly choose and analyse individual or specific days without requiring extensive filtering.
- **Slicers:** Created from Pivot Tables to enable month-based filtering in the “Month Details” section. The slicers allow users to filter data in the Monthly Details section efficiently.
- **Conditional Formatting:** Highlights key data points based on predefined conditions on both Dashboard and Weather Data worksheets.
- **Basic Excel Functions:** Includes SUM, MAX, COUNTIF, and AVERAGEIF to support data analysis.
- **Search Functions:** Utilizes VLOOKUP, INDEX/MATCH to retrieve specific values based on user inputs.
- **Charts:** Graphical representation of key insights, such as temperature trends over a selected month.

These features work together to create an interactive and insightful data exploration tool.

3. Development Process

Please refer to Formula/Function sections for comprehensive use of the formulas or functions being applied throughout the Excel Dashboard.

3.1 Structuring and Cleaning Data

Before building the dashboard, the raw dataset in the "Data" worksheet was structured into a well-organized table:

- The data was converted into an Excel table for easy referencing.
- **Extra columns** such as “Station Name”, “Date”, “Month Name” were added to analyse and visualise data, also enables to connect with slicers dynamically for selection of “month”, and “Station”. “Temp Range” and “Weather Condition” are added to facilitate filtering and aggregation, to broaden data points.
- The columns have been formatted for certain use. For example, Date as Date, Max, Min Temps, Rainfall, Temp Range are all in numbers with 1 decimal places for easier visual purposes, but also for summarise and aggregation.

3.2 Implementing Pivot Tables

Pivot Tables were created to summarize daily and monthly data:

- **A daily Summary Pivot Table** extracts key metrics based on the selected date.

- A **Month Details Pivot Table** aggregates data across months, enabling users to identify Key metrics.
- Helper Pivot Tables such as **Helper Pivot** (for months) and **Pivot Station** (for stations) were created to better link and interact with the slicers for filtering purposes.

These tables serve as the foundation for the interactive dashboard elements.

3.3 Adding Interactivity with Drop-down Lists and Slicers

- A **drop-down list** (Data Validation) was added in the Daily Details section, allowing users to select a specific day.
- **Slicers** were created and connected to the Pivot Tables to provide a dynamic filtering experience in the Monthly Details section.

3.4 Applying Conditional Formatting

To enhance data visualization, conditional formatting was applied to both Dashboard and Weather Data worksheet:

Dashboard

- **Temperature Ranges:** High level rainfall (>20mms) were highlighted in **Blue**, indicating “Heavy Rain” while, low temperatures (<13°C) were marked in **light blue** as individually, for Cold. Applied differently in the “Month Details”, since there are only months to select, conditional formatting was applied individually to a particular month with Highest Heatwave and Highest Rainfall and low Temp.
- **Row-based Formatting:** Entire rows were coloured based on specific conditions, improving readability. For example, temperatures above 35°C will be row-based, in Daily section.

Weather Data

- **Temperature Ranges:** Similarly, key metrics such as Heatwave (**Red**), Heavy Rain (**Dark Blue**), Highest Temp range fluctuation (**Orange**), High and Low Temperatures have been conditionally formatted with different colour use (**Blue and Light Blue**).
- **Row-based Formatting:** Entire row for “**HEATWAVE**” have been highlighted.

3.5 Formulas/Functions

Several functions were used to calculate important metrics:

- **DATE ()**: Used in F Column (Date). Combined Columns C, D, E and formatted to Date to 1/01/2020.
- **TEXT ()**: Used in G Column (Month Name) to format the Date column to visualise Month name as “January”.

- **MINUS:** A simple Minus formula (-) has applied to get the values of Temp Range in Column K, from Columns I (Max Temp) and J (Min Temp)
- **IF ():** Used in Column L (Weather Conditions), to identify weather conditions such as “Heatwave”, “Heavy Rain”.
- **MAX/SUM/AVERAGE ():** Identifies the highest and lowest values. A short table was created next to the original Weather Data starting in **Column N** to summarise Average Max, Min Temperatures for the Year Per Station. A quick summarise to identify yearly data and compare data with different insights to Monthly or Daily.
- **COUNTIFS ():** Used in **Weather Dashboard**, “Month Detail” section, for cell G19 to extract total number of Weather Conditions in the original Weather Data table. For example, it will give the total number of “Heatwaves” per month, per station.
- **GETPIVOTDATA ():** Used in cells A19 (for **Highest Max Temp**), C19 (for **Lowest Min Temp**), and E19 (**Total Rainfall**) of **Weather Dashboard**, to extract values in the Month Details Pivot table. With slicers linked to Weather Data and Pivot tables it will dynamically review different values Monthly per station.
- **AVERAGEIF ():** Used to extract values for average Max and Min temperatures, which is in cell B19 and D19 of the **Weather Dashboard, Month Detail Section**.
- **VLOOKUP/INDEX/MATCH ():** These functions have been applied through mostly in Dashboard and one in Weather Data worksheet. The **VLOOKUP** has been applied to few areas such as both in Daily and Month details (check cells D6 and F19 of Dashboard and B2 of Weather Data, Station name). The **INDEX/MATCH** combined functions are applied in the **Daily Detail** Section of the **Dashboard** (A6, B6, C6)

3.6 Creating Dynamic Charts

To provide visual insights, charts were included:

- **Pie Chart:** Displays temperature trends over a selected month.
- **Column Chart:** Compares monthly statistics.

4. Challenges and Limitations

Several challenges were encountered during development:

- **Data Formatting:** Checking every column to ensure that the values are formatted to correct data. For example, Date needs to be format in Date, Numbers have to be formatted in Number.
- **Slicer Linking:** One of the big challenges was linking Slicers for dynamic use of selecting each month to each station to view values. It needs extra pivot table for linking for both Station Name and Month Name, manually insert formulas to link them, due to long formulas.
- **Conditional Formatting Conflicts:** Formatting entire rows required careful application to avoid overriding other styles.
- **User Experience (UX) Considerations:** Ensuring that the dashboard remains intuitive for a non-technical audience was a priority.

Despite these challenges, solutions were implemented to enhance performance and usability.

5. Future Developments

The dashboard could be further improved with the following enhancements:

- **Advanced Filtering Options:** Implementing search bars for more refined filtering.
- **Automated Data Updates:** Using Power Query to refresh data automatically.
- **Programming:** Can be used to enhance Dashboard with affects, such as alert flashes.
- **Advanced Visualizations:** Incorporating dynamic heat maps and trend analysis.

These enhancements would improve the dashboard's functionality and provide deeper insights.

6. Conclusion

The interactive Excel dashboard provides an intuitive way to explore data dynamically. By leveraging Pivot Tables, slicers, conditional formatting, and basic Excel functions, the dashboard allows users to gain insights effectively. The development process involved structuring and formatting data, implementing interactive elements, and ensuring usability for a non-technical audience.

Future improvements, such as automated updates and enhanced visualizations, could further enhance its effectiveness, and make it more interactive.

7. Appendix

7.1 Key Formulas Used

- =GETPIVOTDATA ()
- =COUNTIFS ()
- =VLOOKUP ()
- =INDEX/MATCH ()
- =SUM/AVERAGE ()
- =TEXT ()
- =IF ()

7.2 References

Microsoft Resources

<https://support.microsoft.com/en-au/office/getpivotdata-function-8c083b99-a922-4ca0-af5e-3af55960761f>

<https://support.microsoft.com/en-au/office/vlookup-function-0bbc8083-26fe-4963-8ab8-93a18ad188a1>