DATA ANALYTICS WITH POWER BI

PROJECT REPORT

(Project Semester January-April 2025)

Car Sales Performance Dashboard

Submitted by

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B. Tech CSE KM003

Course Code INT 374

Under the Guidance of

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Discipline of CSE

Lovely School of Computer Science

Lovely Professional University, Phagwara

CERTIFICATE

This is to certify that Surendra Mahla bearing Registration no. 12324358 has **completed INT 374** project titled, **"Car Sales Performance Dashboard"** under my guidance and supervision. To the best of my knowledge, the present work is the result of his/her original development, effort and study.

Signature and Name of the Supervisor
Designation of the Supervisor
School of Computer Science
Lovely Professional University
Phagwara, Punjab.

Date:18/12/2025

DECLARATION

I, Surendra Mahla student of **B.Tech** under **IT Discipline** at **Lovely Professional University**, Punjab, hereby declare that all the information furnished in this project report is based on my own intensive work and is genuine.

Date:18/12/2025 Signature

Registration No. 12324358 Name : Surendra

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I extend my heartfelt thanks to all the faculty members who directly or indirectly contributed by sharing their knowledge and insights during the course of this project.

Finally, I am grateful to my family and friends for their constant support, encouragement, and motivation throughout the project duration.

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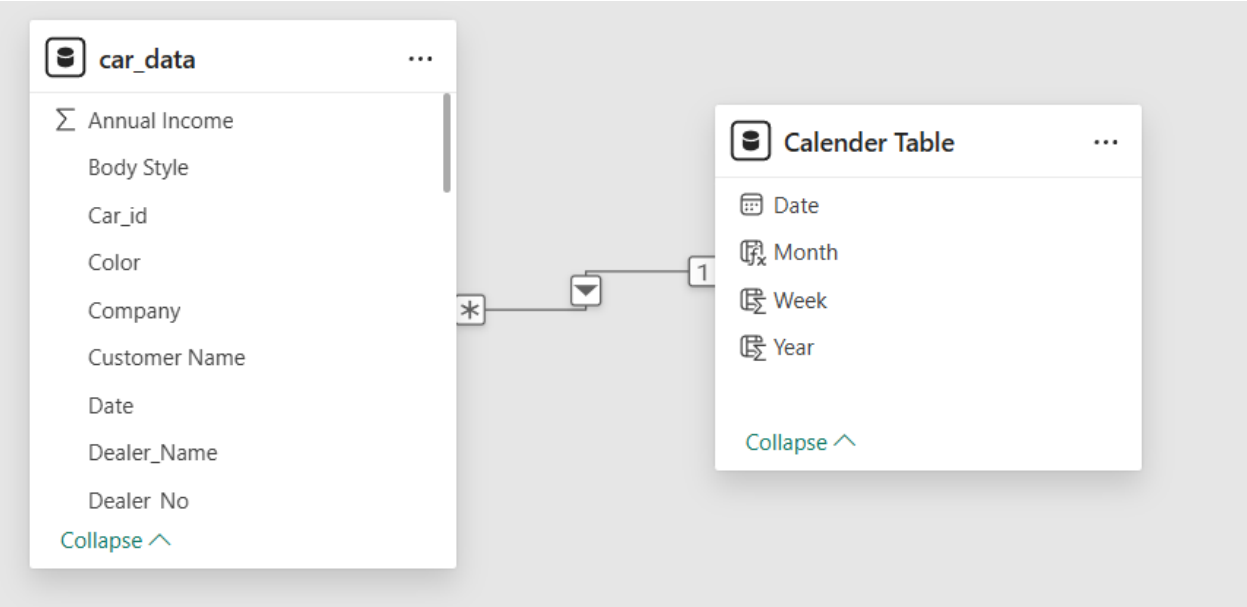
1. : Preview of Car Sales Dataset

Car_id	Date	Customer Name	Gender	Annual Income	Dealer_Name	Company	Model	Engine	Transmission
C_CND_000014	02 January 2022	Harrison	Male	13500	Scrivener Performance Engineering	BMW	323i	Double Overhead Camshaft	Auto
C_CND_000029	02 January 2022	Sloane	Male	13500	Race Car Help	Chrysler	LHS	Overhead Camshaft	Manual
C_CND_000070	04 January 2022	Toby	Male	13500	Clay Johnson Auto Sales	Mitsubishi	Diamante	Double Overhead Camshaft	Auto
C_CND_000085	05 January 2022	Amelia	Male	13500	Pitre Buick-Pontiac-Gmc of Scottsdale	Chevrolet	Impala	Overhead Camshaft	Manual
C_CND_000106	06 January 2022	Amirah	Male	13500	Saab-Belle Dodge	Nissan	Pathfinder	Double Overhead Camshaft	Auto
C_CND_000155	12 January 2022	Nina	Male	13500	McKinney Dodge Chrysler Jeep	Pontiac	Bonneville	Double Overhead Camshaft	Auto
C_CND_000158	12 January 2022	Arthur	Male	13500	New Castle Ford Lincoln Mercury	Ford	Mustang	Overhead Camshaft	Manual
C_CND_000210	19 January 2022	Brianna	Male	13500	Chrysler Plymouth	Volkswagen	Passat	Overhead Camshaft	Manual
C_CND_000223	21 January 2022	Kieran	Male	13500	Star Enterprises Inc	Nissan	Frontier	Overhead Camshaft	Manual
C_CND_000239	21 January 2022	Ahmed	Male	13500	C & M Motors Inc	Pontiac	Bonneville	Double Overhead Camshaft	Auto
C_CND_000306	31 January 2022	Lukas	Male	13500	Motor Vehicle Branch Office	Dodge	Stratus	Overhead Camshaft	Manual
C_CND_000331	03 February 2022	Gabriella	Male	13500	Rabun Used Car Sales	Volkswagen	Beetle	Double Overhead Camshaft	Auto
C_CND_000333	03 February 2022	Genesis	Male	13500	Ryder Truck Rental and Leasing	Saturn	LW	Overhead Camshaft	Manual
C_CND_000366	06 February 2022	Hailey	Male	13500	Star Enterprises Inc	Jeep	Wrangler	Double Overhead Camshaft	Auto
C_CND_000380	06 February 2022	Alexandre	Male	13500	Saab-Belle Dodge	Nissan	Frontier	Overhead Camshaft	Manual
C_CND_000400	07 February 2022	Danny	Male	13500	Star Enterprises Inc	Jeep	Wrangler	Double Overhead Camshaft	Auto
C_CND_000470	14 February 2022	Kaylee	Male	13500	Race Car Help	ntiac	Bonneville	Double Overhead Camshaft	Auto
C_CND_000473	14 February 2022	Vanessa	Male	13500	U-Haul CO	Plymouth	Prowler	Overhead Camshaft	Manual
C_CND_000484	14 February 2022	Gabriel	Male	13500	McKinney Dodge Chrysler Jeep	Chevrolet	Monte Carlo	Overhead Camshaft	Manual
C_CND_000546	18 February 2022	Omar	Male	13500	Scrivener Performance Engineering	Dodge	Ram Van	Double Overhead Camshaft	Auto
C_CND_000547	18 February 2022	Lauren	Male	13500	Scrivener Performance Engineering	Volkswagen	Passat	Overhead Camshaft	Manual
C_CND_000560	20 February 2022	Leah	Male	13500	Tri-State Mack Inc	Mitsubishi	Diamante	Overhead Camshaft	Manual
C_CND_000609	27 February 2022	Rayan	Male	13500	Tri-State Mack Inc	BMW	323i	Double Overhead Camshaft	Auto
C_CND_000614	27 February 2022	Malia	Male	13500	Hatfield Volkswagen	Mercedes-B	M-Class	Overhead Camshaft	Manual
C_CND_000625	27 February 2022	Joseph	Male	13500	Chrysler of Tri-Cities	Volkswagen	Passat	Overhead Camshaft	Manual
C_CND_000635	28 February 2022	Julian	Male	13500	Classic Chevy	Audi	A4	Overhead Camshaft	Manual
C_CND_000651	01 March 2022	Maryam	Male	13500	New Castle Ford Lincoln Mercury	Ford	Explorer	Double Overhead Camshaft	Auto
C_CND_000661	01 March 2022	Mae	Male	13500	C & M Motors Inc	Mitsubishi	Diamante	Overhead Camshaft	Manual
C_CND_000680	02 March 2022	Axelle	Male	13500	Chrysler Plymouth	Dodge	Ram Van	Double Overhead Camshaft	Auto
C_CND_000771	06 March 2022	Riley	Male	13500	Chrysler of Tri-Cities	Toyota	Tacoma	Double Overhead Camshaft	Auto
C_CND_000775	06 March 2022	Nicholas	Male	13500	Scrivener Performance Engineering	Infiniti	I30	Overhead Camshaft	Manual
C_CND_000800	08 March 2022	Samara	Male	13500	Saab-Belle Dodge	Mitsubishi	Diamante	Overhead Camshaft	Manual
C_CND_000815	08 March 2022	Savannah	Male	13500	Iceberg Rentals	Subaru	Forester	Overhead Camshaft	Manual

Star Enterprises Inc

2. Model View



3. DAX Measures

```
YTD avg Price = TOTALYTD([Avg Price], 'Calender Table'[Date])
```

```
YTD Cars Sold = TOTALYTD(COUNT(car_data[Car_id]),'Calender Table'[Date])
```

```
YTD Total Sales = TOTALYTD(SUM(car_data[Price ($)]),'Calender Table'[Date])
```

```
MTD Total Sales = TOTALMTD(SUM(car_data[Price ($)]), 'Calender Table'[Date])
```

```
MTD KPI = CONCATENATE("MTD Total Sales : ", FORMAT([MTD Total Sales] / 1000000, "$0.00M"))
```

```
MTD Cars Sold KPI = CONCATENATE("MTD Cars Sold : ", FORMAT([MTD Cars Sold] / 1000, "$0.00K"))
```

```
MTD Cars Sold = TOTALMTD(COUNT(car_data[Car_id]), 'Calender Table'[Date])
```

```
MTD Avg Price KPI = CONCATENATE("MTD Avg Price : ", FORMAT([MTD Avg Price] / 1000, "$0.00K"))
```

```
MTD Avg Price = TOTALMTD([Avg Price], 'Calender Table'[Date])
```

```
Max Point = IF(MAXX(ALLSELECTED('Calender Table'[Week]), [Total Sales]) = [Total Sales], MAXX(ALLSELECTED('Calender Table'[Week]), [Total Sales]), BLANK())
```

```
Cars Sold Diff = [YTD Cars Sold] - [PYTD Cars Sold]
```

```
Cars Sold Colour = IF([Cars Sold Diff]>0, "Green" ,"Red")
```

```
1  Avg Price Diff = [YTD avg Price] - [PYTD Avg Price]
```

```
1  PYTD Avg Price = CALCULATE([Avg Price],SAMEPERIODLASTYEAR('Calender Table'[Date]))
```

```
1  PYTD Cars Sold = CALCULATE(COUNT(car_data[Car_id]), SAMEPERIODLASTYEAR('Calender Table'[Date]))
```

```
1  PYTD Total Sales = CALCULATE(SUM(car_data[Price ($)]),SAMEPERIODLASTYEAR('Calender Table'[Date]))
```

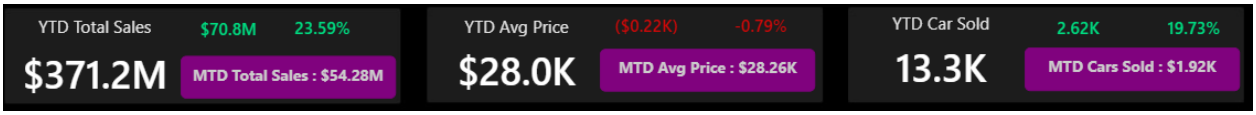
```
1  Total Sales = SUM(car_data[Price ($)])
```

```
1  YOY Avg Price Growth = [Avg Price Diff] / [PYTD Avg Price]
```

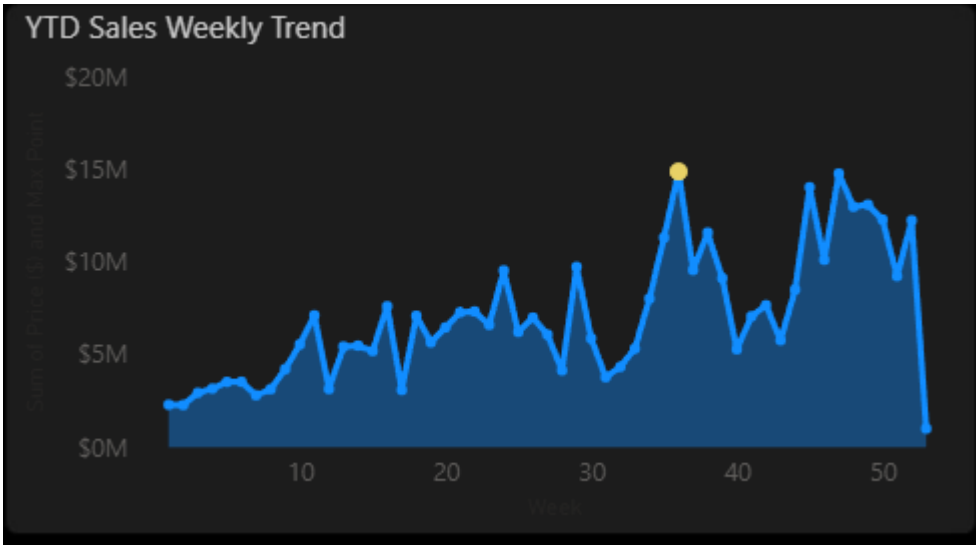
```
1  YOY Car Sold Growth = [Cars Sold Diff] / [YTD Cars Sold]
```

```
1  YOY Sales Growth = [Sales Difference] / [PYTD Total Sales]
```

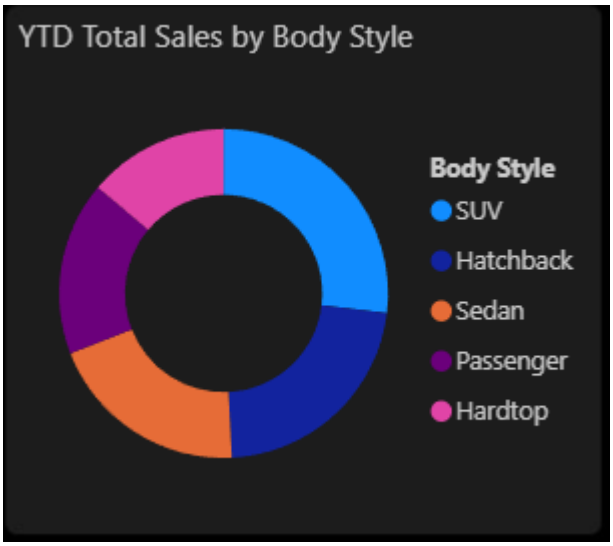
4. *Key Performance Indicators (KPI Cards)*



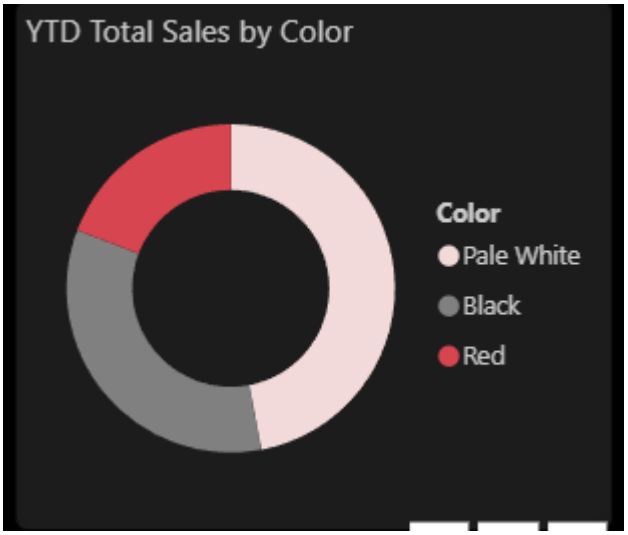
5. Weekly Trend of Year-to-Date Sales



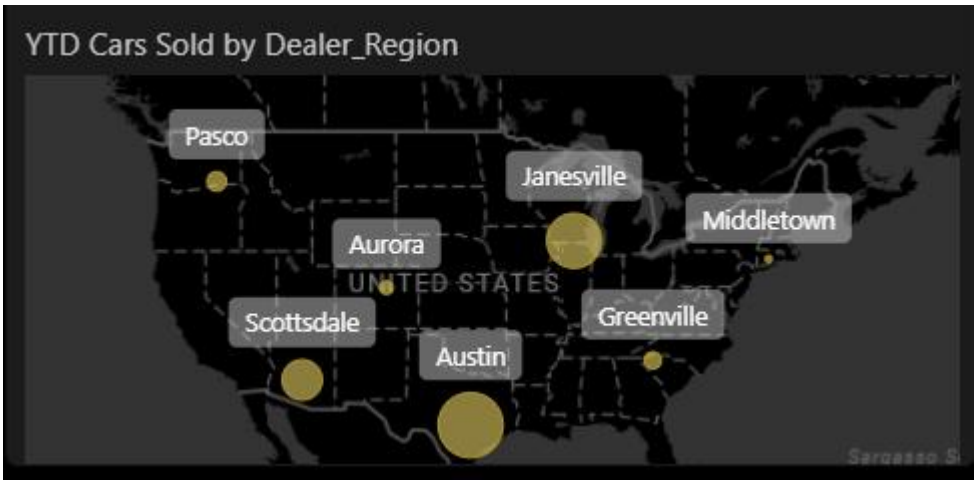
6: YTD Total Sales by Body Style



7: YTD Total Sales by Color



8: Dealer Region-Wise Car Sales Distribution

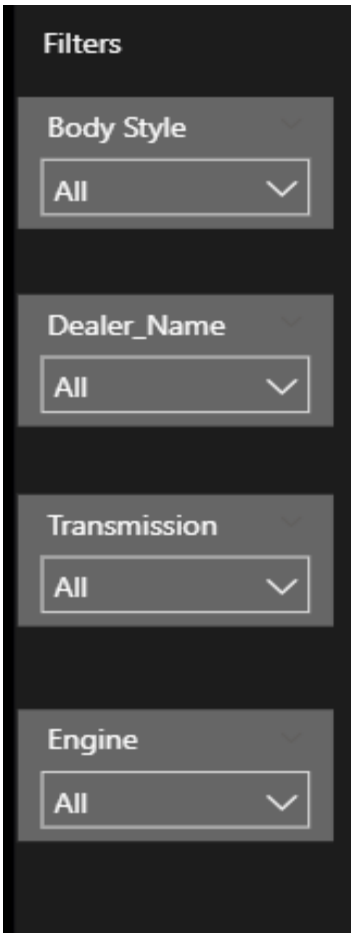


9. Company-Wise Sales Trend

Company wise Sales Trend

Company	YTD avg Price	YTD Cars Sold	YTD Total Sales	%GT YTD Total Sales
Acura	$24.9K	376.0	$9.3M	2.52%
Audi	$22.2K	259.0	$5.8M	1.55%
BMW	$25.7K	445.0	$11.4M	3.08%
Buick	$32.2K	243.0	$7.8M	2.11%
Cadillac	$42.2K	363.0	$15.3M	4.13%
Chevrolet	$26.0K	1043.0	$27.1M	7.30%
Chrysler	$25.9K	618.0	$16.0M	4.31%
Dodge	$26.4K	949.0	$25.0M	6.74%

10. Dashboard Interactivity Using Slicers



1) Introduction

The automobile industry is one of the most competitive and data-driven industries in the world. With increasing customer expectations, changing market dynamics, and intense competition among car manufacturers and dealerships, organizations must continuously monitor and analyze their sales performance. Traditional reporting methods such as spreadsheets and static reports are no longer sufficient to handle large datasets or provide real-time insights.

Car dealerships deal with multiple dimensions of data including car models, body styles, colors, transmission types, engine types, dealer locations, pricing, and time-based sales records. Without proper analytical tools, identifying trends, growth opportunities, and performance gaps becomes extremely difficult.

Business Intelligence (BI) tools, such as Microsoft Power BI, provide a solution by enabling users to transform raw data into interactive dashboards and visual reports. Power BI allows

users to combine data from multiple sources, clean and model data efficiently, and create dynamic visualizations that respond to filters and slicers.

This project aims to design and develop a **Car Sales Dashboard** that provides a consolidated view of sales performance. The dashboard helps stakeholders quickly understand how sales are performing over time, which car body styles and colors are most popular, which dealer regions generate the highest revenue, and how different companies contribute to total sales. By visualizing KPIs and trends, management can make faster and more informed decisions.

2) Objectives of the Project

The primary objectives of this project are as follows:

1. To design and develop a **dynamic and interactive Car Sales Dashboard** using Microsoft Power BI.
2. To analyze overall sales performance using key performance indicators such as YTD, MTD, and YOY metrics.
3. To study price-related trends by analyzing average selling prices over time.
4. To understand customer preferences by analyzing sales distribution across different car body styles and colors.
5. To evaluate regional performance by visualizing dealer region-wise car sales on a map.
6. To compare company-wise performance using tabular and graphical representations.
7. To provide a centralized analytical platform that supports data-driven business decisions.
8. To demonstrate practical application of Power BI concepts such as Power Query, data modeling, DAX calculations, and interactive visuals.

3. PROBLEM STATEMENT

The objective of this project is to design and develop an interactive Car Sales Dashboard in Power BI that provides meaningful insights into sales performance through key metrics and visualizations. The problem statement is divided into two major parts: KPI requirements and chart requirements.

3.1 KPI Requirements

This subsection focuses on defining the key performance indicators (KPIs) that are essential for evaluating the sales performance of the car dealership. These KPIs provide a summarized view of business performance and help management monitor progress effectively.

3.1.1 Sales Overview KPIs

- Year-to-Date (YTD) Total Sales

- Month-to-Date (MTD) Total Sales
- Year-over-Year (YOY) Growth in Total Sales
- Difference between YTD Sales and Previous YTD Sales

3.1.2 Average Price Analysis KPIs

- YTD Average Price
- MTD Average Price
- YOY Growth in Average Price
- Difference between YTD and Previous YTD Average Price

3.1.3 Cars Sold Metrics

- YTD Cars Sold
- MTD Cars Sold
- YOY Growth in Cars Sold
- Difference between YTD and Previous YTD Cars Sold

3.2 Charts Requirements

This subsection defines the visualizations required to analyze and present the KPIs in an effective and user-friendly manner.

3.2.1 YTD Sales Weekly Trend

A line chart is used to represent the weekly trend of YTD sales, where the X-axis represents weeks and the Y-axis represents total sales amount.

3.2.2 YTD Total Sales by Body Style

A pie chart is used to visualize the contribution of different car body styles to total YTD sales.

3.2.3 YTD Total Sales by Color

A pie chart is used to analyze sales distribution based on car color preferences.

3.2.4 YTD Cars Sold by Dealer Region

A map visualization is used to represent sales distribution across different dealer regions.

3.2.5 Company-Wise Sales Trend

A tabular grid is used to display company-wise YTD sales figures.

3.2.6 Detailed Sales Information Grid

A detailed table is provided to show transaction-level car sales data.

3.2) Dataset Source

Data set Link: https://www.kaggle.com/datasets/missionjee/car-sales-report

4. DATASET DESCRIPTION

The dataset used in this project represents transactional car sales data collected from dealership operations. Each row in the dataset corresponds to a single car sale transaction. The dataset includes both numerical and categorical attributes that allow detailed analysis across multiple dimensions.

Key Attributes:

- Car Model
- Body Style (SUV, Sedan, Hatchback, etc.)
- Color
- Sales Amount
- Dealer Name
- Dealer Region
- Company/Brand
- Transmission Type
- Engine Type
- Sales Date

The dataset is structured and well-suited for time-series analysis, aggregation, filtering, and visualization. It supports both high-level performance evaluation and detailed transaction-level analysis.

5. DATA PREPARATION & CLEANING

Data preparation is a critical step in any analytics project, as inaccurate or inconsistent data can lead to misleading insights. In this project, data cleaning and transformation were performed using **Power Query Editor** in Power BI.

Data Cleaning Steps:

- Removal of missing and null values to ensure completeness
- Elimination of duplicate records to avoid double counting
- Correction of incorrect or inconsistent data types
- Standardization of text fields such as body style and color names

- Filtering out irrelevant or incomplete records

Data Transformation:

- Creation of new columns such as Year, Month, and Week from the sales date
- Formatting numerical values for consistency
- Renaming columns for clarity and better understanding

These steps ensured that the dataset was accurate, consistent, and ready for analysis.

6. DATA MODELING (VERY DETAILED EXPLANATION)

Data modeling is one of the most important steps in building an effective Power BI dashboard because it defines how different tables are connected and how data flows between them. A well-designed data model ensures accurate calculations, smooth filtering, faster performance, and meaningful insights.

In this project, a structured data modeling approach similar to a star schema was used. The main fact table contains detailed car sales transaction data, such as sales amount, car model, body style, color, dealer region, company name, and sales date. Each row in this table represents an individual car sale, making it the central source for analysis.

To support efficient analysis, supporting or lookup tables were logically connected to the main sales table. These tables include attributes such as date-related information (year, month, week), dealer details, and product-related attributes. Relationships were established using primary keys and foreign keys, ensuring data consistency across all tables.

Proper relationships allow slicers and filters to work seamlessly. For example, when a user selects a particular body style or dealer region, all visuals on the dashboard update automatically based on that selection. This interconnected structure enables drill-down analysis from a high-level summary to detailed transactional data.

A well-designed data model also improves performance by reducing redundancy and avoiding unnecessary data duplication. It ensures that calculations such as YTD sales, MTD sales, and YOY growth are computed correctly and efficiently. Overall, the data model provides a strong foundation for accurate reporting, interactive analysis, and reliable decision-making.

7. DAX Calculations

Data Analysis Expressions (DAX) is a powerful formula language used in Power BI to create custom calculations and measures. In this project, DAX plays a critical role in transforming raw sales data into meaningful key performance indicators (KPIs).

DAX calculations were used to compute important metrics such as **Year-to-Date (YTD) Sales**, **Month-to-Date (MTD) Sales**, **Year-over-Year (YOY) Growth**, **Average Price**, and **Cars Sold Metrics**. These measures allow the dashboard to dynamically calculate results based on the selected time period, region, or product category.

One of the key advantages of DAX is its ability to handle **time intelligence functions**. Using these functions, the dashboard can automatically compare current sales with previous periods, such as comparing this year's sales with last year's sales. This helps management easily identify growth patterns, seasonal trends, and performance gaps.

DAX measures are filter-aware, meaning they respond instantly to slicers and filters applied by the user. For example, if a user selects a specific body style or dealer region, all KPI values and charts recalculate automatically. This dynamic behavior makes the dashboard interactive and flexible.

Overall, DAX calculations enhance the analytical power of the dashboard by enabling accurate, real-time, and comparative analysis. They ensure that business metrics are consistent across all visuals and support informed, data-driven decision-making.

8. Dashboard Design & Development

The dashboard design focuses on clarity, usability, and visual effectiveness. A **dark-themed layout** was chosen to reduce eye strain and highlight key metrics clearly. The layout is structured in a logical manner so that users can quickly understand the overall sales performance without confusion.

At the top of the dashboard, **KPI cards** are placed to provide an instant overview of important metrics such as YTD Total Sales, YTD Average Price, and YTD Cars Sold. These cards help management grasp the current performance at a glance.

Interactive **slicers** are included for attributes such as body style, dealer name, transmission type, and engine type. These slicers allow users to filter data based on their requirements and explore different perspectives of the sales data.

Consistent color coding is applied across all charts to maintain uniformity and avoid misinterpretation. Clear titles, axis labels, legends, and tooltips are used to enhance understanding. The dashboard avoids unnecessary clutter by focusing only on relevant visuals, following best practices of data visualization.

Overall, the dashboard is designed to be intuitive, interactive, and business-focused, enabling users to explore data efficiently and gain actionable insights.

9. DETAILED KPI INTERPRETATION AND BUSINESS MEANING

Key Performance Indicators (KPIs) are not only numerical values but also represent the overall health of the business. In this project, KPIs such as YTD Sales, MTD Sales, YOY Growth, Average Price, and Cars Sold metrics were carefully designed to provide meaningful interpretation rather than just raw numbers.

Year-to-Date (YTD) Sales represent the cumulative sales performance from the beginning of the year up to the current date. This KPI helps management evaluate whether sales targets are being met and whether the business is moving in the right direction. A steady increase in YTD sales indicates healthy growth, while stagnation or decline signals the need for corrective actions.

Month-to-Date (MTD) Sales provide a short-term view of performance. This metric is useful for monitoring monthly targets, promotional effectiveness, and immediate sales performance. By comparing MTD values across months, management can identify strong and weak months.

Year-over-Year (YOY) Growth is one of the most important KPIs because it compares current performance with the same period in the previous year. This removes seasonal bias and provides a fair comparison. Positive YOY growth indicates business expansion, while negative growth highlights performance gaps.

Average Price KPIs help in understanding pricing strategies and customer spending behavior. A rise in average price may indicate increased demand for premium vehicles, while a decline may suggest discounting strategies or increased sales of lower-priced models.

Cars Sold Metrics measure sales volume and market demand. Even if revenue is high, a low number of cars sold may indicate high pricing, whereas high volume with low revenue may suggest aggressive discounting. Together, these KPIs provide a balanced understanding of business performance.

10. ROLE OF INTERACTIVITY AND SLICERS IN DECISION MAKING

One of the strongest features of this Power BI dashboard is its interactivity. Interactive dashboards allow users to explore data dynamically instead of relying on static reports. In this project, slicers play a crucial role in enabling interactive analysis.

Slicers are provided for attributes such as **Body Style, Dealer Name, Transmission Type, Engine Type, and Company**. When a user selects a particular value in a slicer, all KPIs and visualizations update instantly. This allows users to analyze performance from different perspectives without creating multiple reports.

For example, management can use slicers to analyze:

- Sales performance of only **SUVs**
- Performance of a specific **dealer or region**
- Comparison between **automatic and manual transmission vehicles**
- Contribution of a single company to overall sales

This interactivity improves decision-making speed and accuracy. Instead of requesting separate reports for each scenario, decision-makers can explore multiple scenarios themselves. This reduces dependency on analysts and increases data transparency across the organization.

Interactive dashboards also encourage exploratory analysis, where users discover patterns and insights that were not initially anticipated. This makes Power BI dashboards powerful tools for both operational and strategic decision-making.

11. VISUALIZATION STRATEGY AND DESIGN PRINCIPLES USED

Effective data visualization is not just about creating charts but about communicating insights clearly. In this project, several visualization principles were followed to ensure clarity and usability.

A **dark theme** was selected to improve visual contrast and reduce eye strain during prolonged analysis. Important KPIs are highlighted using card visuals at the top of the dashboard, ensuring that users see critical information immediately.

Charts were chosen based on the nature of data:

- **Line charts** were used for time-based trends such as weekly YTD sales because they clearly show increases, decreases, and patterns over time.
- **Pie charts** were used for body style and color analysis to represent proportional contribution.
- **Map visuals** were used to display dealer region-wise sales distribution, adding a geographical perspective.
- **Tabular grids** were used for company-wise and detailed sales data to provide precise numerical information.

Consistent color schemes, proper labels, legends, and titles were applied across all visuals. This consistency avoids confusion and helps users quickly interpret the data. Unnecessary visuals were avoided to reduce clutter and maintain focus on key insights.

12. Insights & Analysis

The analysis of the dashboard reveals several important insights into car sales performance. One of the key findings is that **certain body styles, particularly SUVs, contribute a significant portion of total sales**, indicating strong customer preference for this segment.

Region-wise analysis shows that **specific dealer regions consistently outperform others**, suggesting higher market demand or better dealership performance in those areas. This insight can help management focus on expanding successful regions and improving underperforming ones.

Company-wise analysis highlights that **some companies dominate overall sales and sales volume**, indicating strong brand presence and customer trust. These companies contribute a major share of revenue and cars sold.

The weekly YTD sales trend reveals **seasonal patterns and fluctuations**, which can be useful for inventory planning and promotional strategies. Additionally, average price analysis shows **relative pricing stability with minor variations**, suggesting controlled pricing strategies across time periods.

These insights collectively help stakeholders understand what is driving sales performance and where improvements or strategic changes are needed.

13. CONCLUSION

The **Car Sales Dashboard using Power BI** successfully demonstrates how business intelligence and data visualization tools can convert raw transactional data into meaningful and actionable insights. By integrating KPIs, interactive charts, slicers, and dynamic calculations, the dashboard provides a comprehensive view of sales performance.

The dashboard enables management to monitor key metrics, identify trends, compare performance across regions and companies, and make informed business decisions. It reduces dependency on static reports and manual analysis, saving time and improving accuracy.

This project highlights the importance of data analytics in the automobile industry and showcases the practical application of Power BI in solving real-world business problems. The dashboard serves as an effective decision-support system and can be further enhanced with advanced analytics in the future.