**FINAL PROJECT**

**ADVANCED BUSINESS ANALYTICS (BAIT7423)**

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**SEMESTER: SPRING-2024**

**SUBMISSION DATE: 2nd JULY 2024**

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**ADVANCE BUSINESS ANALYTICS**

# Objectives

1. Analyse sales trends over time to identify seasonal patterns or growth opportunities.
2. Explore the popularity of different product categories across regions.
3. Identify top-selling products within each category to optimize inventory and marketing strategies.
4. Evaluate the performance of specific products or categories in different regions to tailor marketing campaigns accordingly.
5. Understand the gender distribution of your customer base.
6. Identify top-performing dealers based on total sales.
7. Compare average prices across different car models.
8. Determine the most popular car colours among customers.
9. Understand the distribution of engine types in your inventory. Supports decisions on inventory stocking and customer preferences.
10. Evaluate sales performance across different dealer regions and companies.
11. Determine customer preferences for transmission types. Guides inventory decisions and marketing strategies.

# Data Source

**Data set has been acquired from Kaggle.** Kaggle is a data science competition platform and online community of data scientists and machine learning practitioners under Google LLC.

**Data Set Description:**

**Data Set:** Our data set comprises of **car dealership data**. It has been categorized into two tables, table 01 contains the data regarding customer information and table 02 contains data regarding car sales and dealer information.

**Table 01: Customer Information**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Car\_id** | **Date** | **Customer Name** | **Gender** | **Annual Income** |
| C\_CND\_000001 | 01/02/2022 | Geraldine | Male | 13500 |
| C\_CND\_000002 | 01/02/2022 | Gia | Male | 1480000 |
| C\_CND\_000003 | 01/02/2022 | Gianna | Male | 1035000 |
| C\_CND\_000004 | 01/02/2022 | Giselle | Male | 13500 |
| C\_CND\_000005 | 01/02/2022 | Grace | Male | 1465000 |

**Table 02: Car Sales Data**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Company** | **Model** | **Engine** | **Transmission** | **Color** | **Price ($)** | **Dealer\_Region** |
| Ford | Expedition | DoubleÃ | Auto | Black | 26000 | Middletown |
| Dodge | Durango | DoubleÃ‚Â | Auto | Black | 19000 | Aurora |
| Cadillac | Eldorado | Overhead | Manual | Red | 31500 | Greenville |
| Toyota | Celica | Overhead | Manual | Pale White | 14000 | Pasco |
| Acura | TL | Double | Auto | Red | 24500 | Janesville |

# Tools and Techniques

PowerBI: To create dashboards and visualizations.

# Data Analysis

1. **Customer Demographics Analysis**

**Distribution of Customers by Gender**

* **Visualization:** Pie Chart
* **Benefit:** Understand the gender distribution of customer base.

1. **Sales Analysis**

**Total Sales by Dealer**

* **Visualization:** Bar Chart
* **Benefit:** Identify which dealers are generating the most sales.

**Average Price by Car Model**

* **Visualization:** Bar Chart
* **Benefit:** Compare the average prices of different car models to identify pricing trends.

**Sales by Customer Segments:**

* **Analysis:** Compare sales performance across different customer segments (e.g., Gender, Annual Income).
* **Visualization:** Clustered Bar Chart.
* **Action:** Drag Gender or Annual Income to Axis and Price (Sum) to Values.
* **Benefit:** Understand which customer segments are contributing most to sales.

**Sales by Product Categories:**

* **Analysis:** Evaluate sales performance by different car models, engine types, body styles, etc.
* **Visualization:** Stacked Bar Chart or Tree Map.
* **Action:** Drag Model, Engine, or Body Style to Axis/Category and Price (Sum) to Values.
* **Benefit:** Identify which products are driving sales and which ones may need attention.

**Sales Trend Over Time**

* **Visualization:** Line Chart
* **Action:** Drag Date to Axis and Price (Sum) to Values.
* **Benefit:** Observe sales performance over different time periods.

1. **Product Analysis**

**Popular Car Colors**

* **Visualization:** Pie Chart
* **Benefit:** Determine the most popular car colors among customers.

**Engine Types Distribution**

* **Visualization:** Donut Chart
* **Benefit:** Understand the distribution of different engine types in your inventory.

1. **Dealer Performance Analysis**

**Sales by Dealer Region**

* **Visualization:** Map
* **Benefit:** Visualize the geographical distribution of sales to identify strong and weak regions.

1. **Customer Preferences Analysis**

**Transmission Preference**

* **Visualization:** Pie Chart or Bar Chart
* **Benefit:** Identify customer preference for automatic or manual transmission.

**Preferred Body Style**

* **Visualization:** Bar Chart
* **Benefit:** Determine which body styles are most popular among customers.

**Dealer Performance by Region and Company**

* **Visualization:** Stacked Bar Chart
* **Benefit:** Evaluate dealer performance across different regions and companies to identify high-performing dealers and potential areas for improvement.

# Predictive Analysis

1. **Customer Purchase Prediction**

Predicting the likelihood of a customer purchasing a specific car model based on their annual income, gender, and past purchases.

* **Visualization:** Scatter Chart
* **Benefit:** Helps in identifying target customer segments for specific car models based on demographic and financial data, aiding in tailored marketing strategies. By visualizing the likelihood of different customer demographics purchasing specific car models, businesses can target marketing campaigns more effectively. For instance, if a certain income group predominantly buys luxury models, promotions can be tailored to appeal to this group.

**Explanation:** Using a scatter chart with annual income and price, overlaid with gender and car model details, helps in identifying trends and preferences across different customer segments.

1. **Sales Influence of Car Features**

Analyzing the impact of car features (Engine, Transmission, Body Style) on sales.

* **Visualization:** Clustered Column Chart
* **Benefit:** Understands which car features are more influential in driving sales, aiding in product development and feature prioritization. Understanding which features drive sales can inform future product development and customization options. For example, if cars with automatic transmissions and a specific body style sell more, production can be adjusted accordingly.

**Explanation:** A clustered column chart comparing sales across different features (engine type, transmission, body style) helps in identifying which combinations are most popular. This information can guide decisions on what features to promote or enhance in future models.

# Insights and Recommendations

Based on the analyses and insights you can derived from Power BI report using the provided dataset, here are some actionable recommendations for the respective business.

**1. Customer Segmentation and Targeting**

* **Recommendation:** Segment customers based on demographics (gender, income) and purchasing behavior (repeat purchases).
* **Actionable Insights:** Tailor marketing campaigns and promotions to specific customer segments. For example, focus higher-end models on customers with higher incomes, and consider loyalty programs for repeat buyers.

**2. Dealer Performance Optimization**

* **Recommendation:** Evaluate dealer performance across regions and companies.
* **Actionable Insights:** Identify top-performing dealers and regions. Provide additional support and incentives to underperforming dealers. Adjust inventory and marketing strategies based on regional sales trends and dealer performance metrics.

**3. Product and Pricing Strategies**

* **Recommendation:** Analyze sales performance by model, engine type, transmission, and body style.
* **Actionable Insights:** Adjust inventory levels based on popular models and preferred specifications. Review pricing strategies to align with market demand and competitive landscape. Consider bundling options or promotional pricing for slower-moving inventory.

**4. Seasonal and Promotional Planning**

* **Recommendation:** Review seasonal sales trends and popular car colors.
* **Actionable Insights:** Plan promotions and marketing campaigns around seasonal peaks. Stock inventory accordingly to meet anticipated demand during peak seasons. Offer incentives for popular car colors identified in customer preferences analysis.

**5. Customer Experience Enhancement**

* **Recommendation:** Monitor customer satisfaction metrics and feedback.
* **Actionable Insights:** Implement improvements based on customer feedback, focusing on areas such as dealership experience, vehicle features, and after-sales service. Use insights from customer segmentation to personalize interactions and improve overall satisfaction.

**6. Operational Efficiency**

* **Recommendation:** Streamline operations based on sales and inventory insights.
* **Actionable Insights:** Optimize inventory management to reduce carrying costs while ensuring availability of popular models. Use predictive analytics to forecast demand and adjust procurement and distribution strategies accordingly.

**7. Future Growth Strategies**

* **Recommendation:** Explore expansion opportunities based on regional sales performance and market demand.
* **Actionable Insights:** Identify untapped markets or regions with potential for growth. Develop strategies to enter new markets or expand dealership networks based on insights from dealer performance and regional sales analysis.

**8. Continuous Monitoring and Adaptation**

* **Recommendation:** Establish regular review cycles for performance metrics and KPIs.
* **Actionable Insights:** Monitor key metrics such as sales trends, customer satisfaction scores, and dealer performance on an ongoing basis. Adapt strategies and tactics based on real-time data to capitalize on emerging opportunities and mitigate risks.

In conclusion, by implementing these recommendations, the company can leverage the power of data-driven insights to enhance operational efficiency, improve customer satisfaction, optimize sales performance, and drive sustainable growth in automotive business.