**Project Report: Social Media Advertising Analysis and Visualization**

**Project Overview**

The goal of this project was to analyze and visualize a social media advertising dataset to derive actionable insights, particularly focusing on **Cost per Click (CPC)** and **Conversion Rate** across different advertising channels and audience segments. We used **Python** for data preparation and **Tableau** for building an interactive dashboard that showcases trends, channel performance, and audience effectiveness.

This report outlines the key steps we followed, the visualizations created, and the final conclusions drawn from the analysis.

**2. Steps Undertaken**

**A. Data Preparation and Processing in Python**

* **Loaded Dataset**: We began by loading the dataset in Python using the panda’s library.
* **Data Cleaning**:
  + Handled missing values for key fields such as **Impressions per Day** and **Conversion Rate**, filling them with mean values where necessary.
  + Removed unnecessary or empty columns (e.g., unnamed columns) to streamline the dataset.
* **Feature Engineering**:
  + Created a unified **Audience\_Segment** field by combining multiple audience-related columns into one, enabling better segmentation.
  + Encoded channel usage fields (Channel Used Facebook, Channel Used Instagram, etc.) into a common **Channel\_Used** field.
* **Exported Clean Data**: After processing, the cleaned and enhanced dataset was exported to a CSV file, ready for Tableau visualization.

**B. Visualization and Dashboard Creation in Tableau**

We built an interactive dashboard in Tableau to showcase key insights from the dataset. The dashboard included multiple visualizations that users could explore using filters.

**3. Key Visualizations Created**

**1. CPC by Channel (Bar Chart)**

* **Objective**: Compare the **average Cost per Click (CPC)** across different advertising channels.
* **Visualization**: A **bar chart** showing CPC for Facebook, Instagram, Pinterest, and Twitter.
* **Key Insights**: Pinterest had the highest average CPC, while Facebook and Twitter had lower CPCs. This suggests that Pinterest may be more expensive for advertisers, while Twitter and Facebook offer more cost-effective options.

**2. Conversion Rate by Audience Segment (Boxplot)**

* **Objective**: Visualize the **distribution of conversion rates** for different audience segments (e.g., Young Adults, Middle-aged Adults).
* **Visualization**: A **boxplot** showing the spread of conversion rates across different audience segments.
* **Key Insights**:
  + **Older Adults** had a relatively lower conversion rate than **Young Adults** and **Middle-aged Adults**.
  + The spread in conversion rates indicates that **Older Adults** may require a different marketing approach, as they convert less effectively compared to other groups.

**3. CPC and Conversion Rate Trends Over Time (Dual Axis Line Chart)**

* **Objective**: Analyze the trends of **Cost per Click (CPC)** and **Conversion Rate** over the course of a month.
* **Visualization**: A **dual-axis line chart** showing CPC and Conversion Rate trends over time.
* **Key Insights**:
  + Both **CPC** and **Conversion Rate** remained fairly stable throughout the month but showed a significant drop towards the end. This could indicate seasonal factors, changes in marketing spend, or campaign fatigue.
  + **Conversion Rate** remained much lower than CPC, suggesting a potential need for campaign optimization to improve conversions.

**4. Interactive Filters**

* **Filters Added**: Filters for Audience\_Segment and Channel\_Used were applied across all visualizations, allowing users to interact with the data and focus on specific segments or channels.
* **Objective**: To enhance the interactivity of the dashboard and allow dynamic data exploration.
* **Outcome**: Users can now filter the entire dashboard to view specific audience segments (e.g., **Young Adults**) or channels (e.g., **Instagram**), enabling customized insights.

**4. Final Dashboard**

The final dashboard was created by combining the above visualizations into a single cohesive view. It allows users to:

* Compare **CPC** across channels.
* Analyze **Conversion Rates** across audience segments.
* Explore time-based trends in **CPC and Conversion Rate**.
* Use filters to interactively explore different audience segments and channels.

**5. Conclusions and Key Insights**

* **Pinterest** had the highest average **CPC** across all channels, indicating that advertisers on this platform might pay a premium for clicks. **Facebook** and **Twitter**, on the other hand, offered more affordable CPC rates.
* **Conversion Rates** were highest for **Young Adults** and **Middle-aged Adults**, while **Older Adults** converted at a much lower rate. This indicates that advertising efforts targeting older demographics might require more tailored campaigns to increase conversions.
* The **trends over time** showed that both **CPC** and **Conversion Rate** were relatively stable during most of the month but dropped significantly at the end. This drop could be due to seasonal factors, advertising budget exhaustion, or changes in user behavior towards the end of a campaign cycle.
* The addition of **interactive filters** allows users to drill down into specific channels and audience segments, enhancing the ability to make data-driven decisions.