### **Task: Marketing Campaign Performance Analysis**

**Objective**: Evaluate the effectiveness of various marketing campaigns to optimize future marketing strategies and budgets.

### **Requirements**

#### **1. Campaign Metrics Calculation**

* **Conversion Rate**
* **Cost per Click (CPC)**
* **Cost per Conversion (CPA)**
* **Return on Ad Spend (ROAS)**

**2. Channel Comparison**

* Compare campaign performance across channels based on CTR, conversion rate, CPC, and ROAS.
* Highlight top-performing channels based on conversion rate and ROAS.
* Identify channels with high costs but low ROAS to review and adjust budgets.

#### **3. Demographic Analysis**

* Segment campaign performance by demographics such as **age, gender, and location** to identify high- and low-performing segments.
* Analyze which demographic groups respond best to specific channels or campaign types.
* Provide recommendations for future targeting based on demographic insights.

#### **4. Time-Based Analysis**

* Track campaign performance over time (weekly or monthly) to identify trends or seasonal peaks.
* Examine if certain times of the year yield higher conversions or better ROAS.

#### **5. Dashboard Requirements**

* **KPIs Summary**: Include total impressions, total clicks, total conversions, total spend, total revenue, average CTR, and ROAS.
* **Campaign Performance Overview**: Bar or line charts comparing key metrics (CTR, conversion rate, ROAS) across campaigns.
* **Channel Performance Breakdown**: Visualization (e.g., pie or stacked bar chart) to show distribution of total spend, impressions, and conversions by channel.
* **Demographics Insights**: Charts showing the breakdown of conversions and revenue by age, gender, and location.
* **Trend Analysis**: Line or area chart showing campaign metrics over time (impressions, clicks, conversions).

### **Expected Insights**

1. **Top-Performing Campaigns and Channels**: Identify which campaigns and channels generate the most conversions and revenue for the budget.
2. **Demographic Insights**: Determine which customer demographics are most responsive to the campaigns.
3. **Seasonal or Temporal Trends**: Find patterns in campaign success tied to specific times of the year.
4. **Budget Allocation Recommendations**: Suggest reallocations to high-performing channels and campaigns with a high ROAS, while reducing spend on underperforming segments.