Google Ads Campaign Analysis – Case Study by Aayush Tiwari

Executive Summary

This case study explores the performance of 30 digital marketing campaigns run by Google, aiming to assess the effectiveness of their advertising strategy across regions and devices. The project utilized a combination of Microsoft Excel, Python, and Streamlit to carry out data cleaning, metric calculation, exploratory analysis, and interactive dashboard development. Key performance indicators such as Click-Through Rate (CTR), Cost Per Click (CPC), and Conversion Rate were analyzed in the context of predefined business targets. Through technical rigor and a business-focused approach, the study generated actionable insights and strategic recommendations that can inform Google's campaign optimization efforts.

Business Problem

In today's competitive digital landscape, companies like Google invest substantial budgets into online advertising. However, the return on this investment can vary significantly by region, device type, and campaign strategy. The primary business challenge addressed in this study was to identify which campaigns delivered optimal performance in terms of engagement and conversions, and which required strategic adjustments. Specific questions included: Are we overspending on low-performing campaigns? Which regions and devices convert best? Are we meeting our internal performance targets across the board?

Data Collection and Sources

The dataset used for this analysis was stored in a structured Excel workbook named **Google_Ads_Campaign_Analysis_AayushTiwari.xlsx**. It contained five sheets: Campaign Data, Device Master Table, Region Master Table, Campaign Targets, and Notes/Metadata. Each sheet played a specific role — for example, the Campaign Data sheet included metrics like impressions, clicks, cost, and conversions, while the Device and Region Master Tables provided classification references. The Campaign Targets sheet helped set benchmark values for metrics like CTR, CPC, and Conversion Rate, which were crucial for performance evaluation.

Data Analysis Using Python

After data cleaning in Excel, the analysis was continued using Python, primarily through the pandas and matplotlib libraries. Custom formulas were used to calculate core metrics: CTR was calculated as clicks divided by impressions, CPC as cost divided by clicks, and Conversion Rate as conversions divided by clicks. Campaigns were then ranked based on conversion efficiency, and visualizations were created to illustrate patterns across devices and regions. A Streamlit dashboard was developed to present these insights interactively, allowing end-users to filter and explore the results without any technical background.

Machine Learning and AI Integration

To enhance predictive capability, a simple linear regression model was developed using scikit-learn to estimate conversion counts based on impressions, clicks, and cost. The model helped demonstrate how campaign performance could be forecasted and budget decisions optimized. Additionally, AI-powered insights were incorporated using OpenAI-style prompt engineering. These insights were structured in business language to help decision-makers understand the data narrative — for example, recognizing that a high CTR but low conversion rate might point to a weak landing page or a misaligned call-to-action.

Visualizations and Key Findings

The analysis revealed several noteworthy insights. Campaigns targeting India via mobile devices had the highest ROI, with strong CTR and low CPC, followed by similar patterns in Germany. In contrast, U.S.-based campaigns showed high advertising costs but comparatively lower conversion rates, indicating room for optimization. Devices like desktop generally underperformed when compared to mobile, suggesting the need for device-specific strategy refinement. Visualizations included region-wise CTR trends, device-level conversion matrices, and campaign-wise performance tables aligned against target benchmarks.

Strategic Recommendations

Based on the analysis, several recommendations were proposed. First, budget reallocation is advised, particularly towards high-performing regions like India and Germany. Second, U.S. campaigns should be reviewed for creative and audience alignment, as their cost-efficiency was suboptimal. Third, improving mobile landing page experience could boost conversion rates even further, given the dominance of mobile in traffic and conversions. Lastly, bidding strategies should be optimized to reduce CPC, especially in high-cost markets like the United States.

Conclusion and Future Work

This case study demonstrates how a structured data science approach can uncover hidden patterns and optimize digital campaign strategies. By integrating Excel, Python, and AI methodologies into a unified analysis, the project provides both technical depth and business clarity. Moving forward, this analysis could be scaled by integrating Power BI or Tableau for executive-level reporting or deploying the dashboard via cloud platforms like Streamlit Cloud. The predictive model could also be enhanced using more complex machine learning techniques such as Random Forest or XGBoost, depending on data availability.