

# MARKETING CAMPAIGN ANALYSIS REPORT

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## PROJECT OVERVIEW

This project focuses on a comprehensive data analysis of marketing campaign performance. The goal was to identify which campaigns, channels, audiences, and time frames yield the best outcomes in terms of ROI, engagement, and conversion. Using a structured 10-day analysis plan, we prepared, analyzed, visualized, and derived insights from a marketing campaign dataset using Python and Power BI.

## BUSINESS OBJECTIVE

Marketing teams often deploy multiple campaigns across various platforms and customer segments. However, they rarely have a consolidated, data-driven view of:

- ✓ Which channels are the most effective?
- ✓ What customer segments yield the best ROI?
- ✓ When is the best time to run campaigns?
- ✓ The goal of this analysis is to empower decision-makers to:
- ✓ Optimize campaign strategy
- ✓ Allocate marketing budget more efficiently
- ✓ Improve ROI and customer engagement
- ✓ Monitor ongoing campaign effectiveness with an interactive dashboard

## DATASET DESCRIPTION

The dataset used for this analysis contains historical records of marketing campaigns. Each record includes metadata (company, channel, type, etc.) and performance metrics (clicks, impressions, conversions, cost, etc.).

### Key Columns:

- ✓ Campaign ID: Unique identifier
- ✓ Company: Organization launching the campaign
- ✓ Campaign Type: (Email, Social, TV, etc.)
- ✓ Target Audience: Marketing audience label
- ✓ Duration: Campaign length in days
- ✓ Channel Used: Platform used (Facebook, Email, etc.)
- ✓ Conversion Rate: Percentage of users converted
- ✓ Acquisition Cost: Total customer acquisition cost
- ✓ ROI: Return on investment
- ✓ Date: Campaign start date
- ✓ Clicks: User interactions
- ✓ Impressions: Views
- ✓ Engagement Score: Internal engagement metric
- ✓ Customer Segment: Audience classification

## TOOLS & TECHNOLOGIES USED

- ✓ **Python** (pandas, matplotlib, seaborn): Data cleaning & EDA
- ✓ **Power BI**: Interactive dashboard design, KPI visuals
- ✓ **DAX**: Calculated fields for ROI, CTR, CPC, etc.
- ✓ **GitHub**: Version control & documentation
- ✓ **Jupyter Notebook**: Data exploration

## ANALYSIS PLAN

Day	Task
1	Dataset import & initial understanding
2	Data cleaning and formatting
3	Exploratory Data Analysis (EDA)
4	Feature engineering (CTR, CPC, Profit)
5	KPI creation and DAX calculations
6	Visual design planning (mockups)
7	Power BI Page 1 - Executive Overview
8	Power BI Page 2 - Channel & Audience Insights
9	Power BI Page 3 - Time & Geographic Analysis
10	Report writing, dashboard finalization & GitHub release

## DATA CLEANING & PREPARATION

### Steps Taken:

- ✓ Converted date strings to datetime objects
- ✓ Cast numerical fields correctly (e.g., cost, impressions)
- ✓ Filled missing Engagement Score using median imputation
- ✓ Replaced null Customer Segment entries with "Unknown"
- ✓ Verified no zero division in CTR/CPC formulas
- ✓ Removed duplicates based on Campaign ID

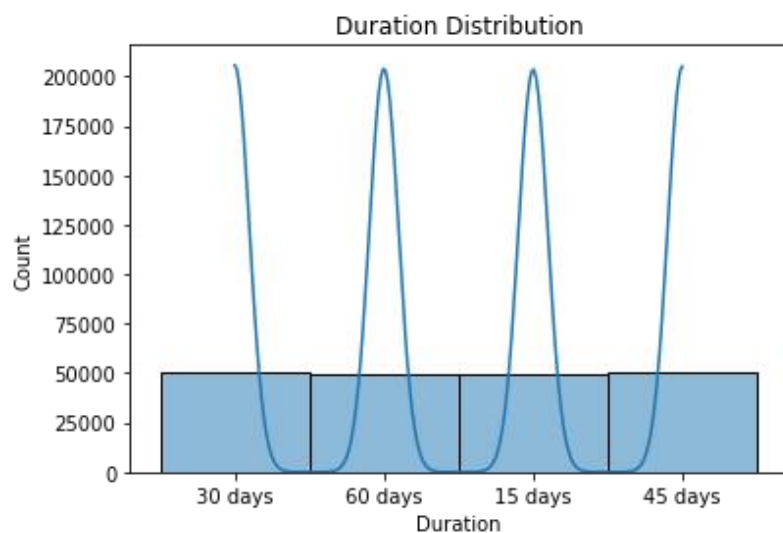
This ensured a clean, analysis-ready dataset suitable for both Python exploration and Power BI ingestion.

## EXPLORATORY DATA ANALYSIS (EDA)

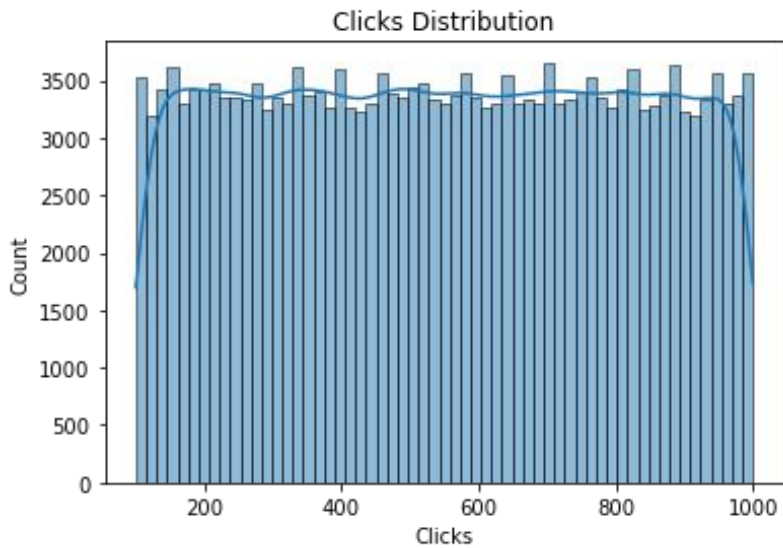
### Univariate Analysis

I explored each variable individually to understand distributions and identify potential outliers:

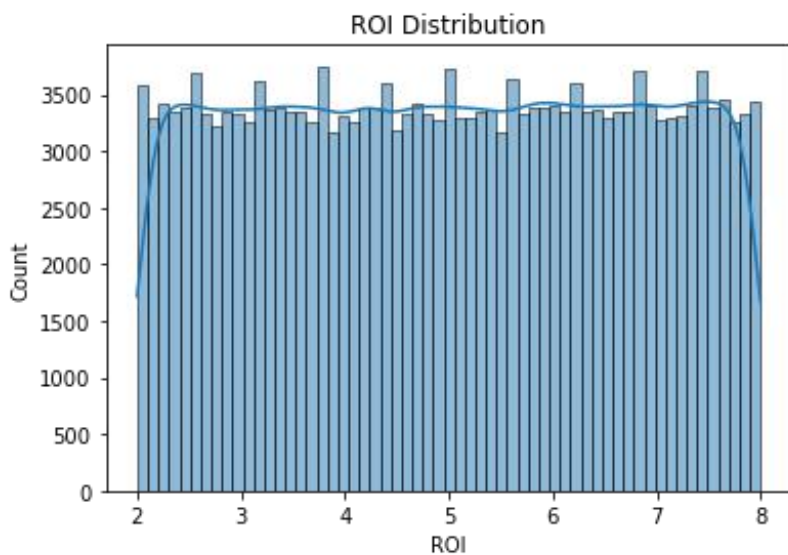
- ✓ **Duration:** Majority of campaigns lasted between 7–14 days.



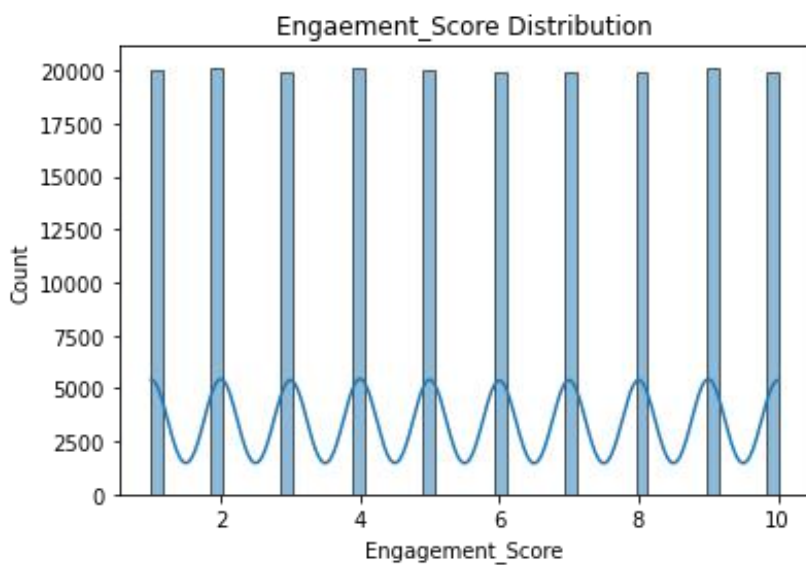
- ✓ **Clicks/Impressions:** Normal-skewed distribution. Few campaigns received extremely high traffic.



- ✓ **ROI:** Most values clustered around 4.5–5.2 with a few low-ROI outliers.

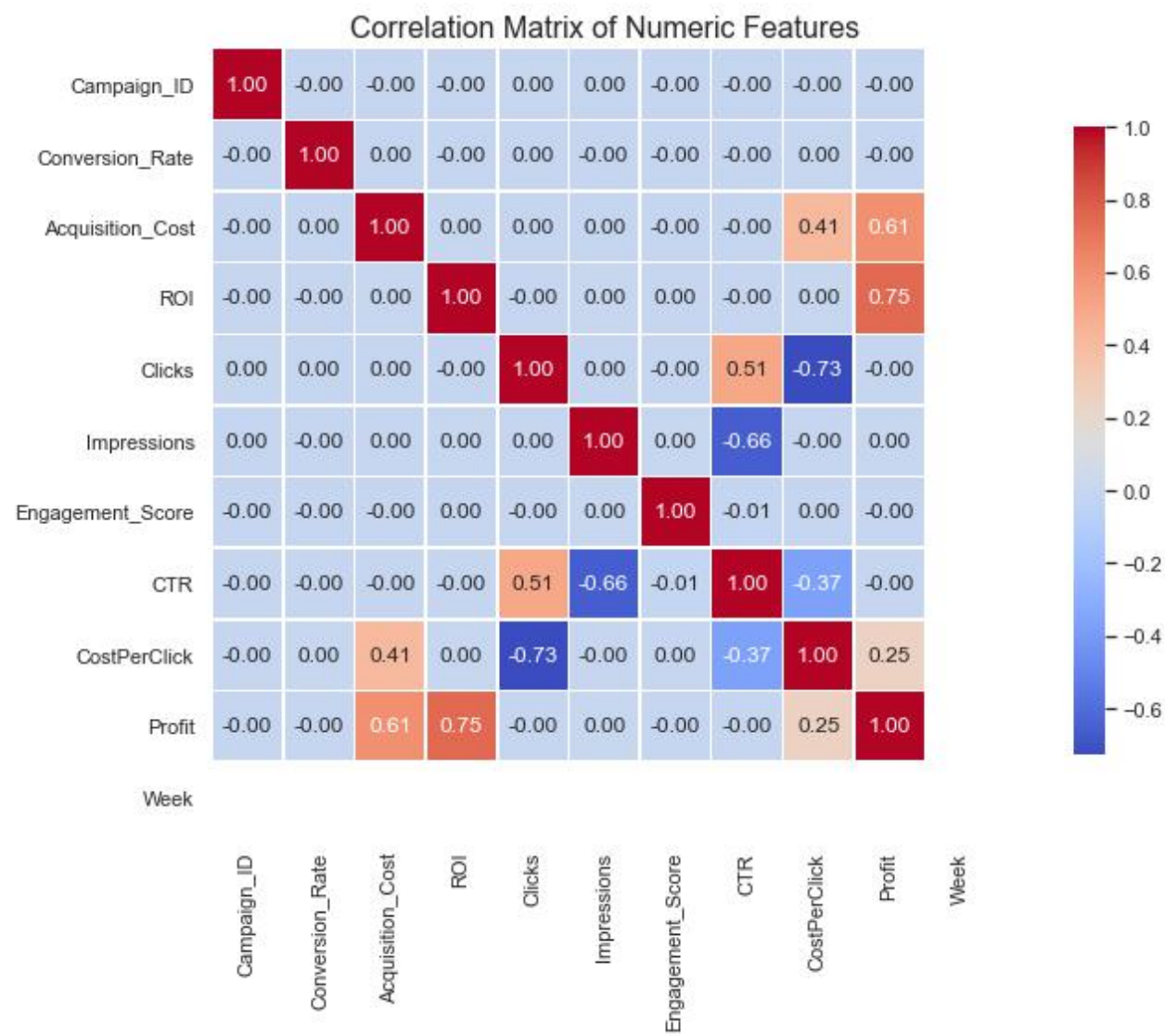


- ✓ **Engagement Score:** Normal-like distribution.



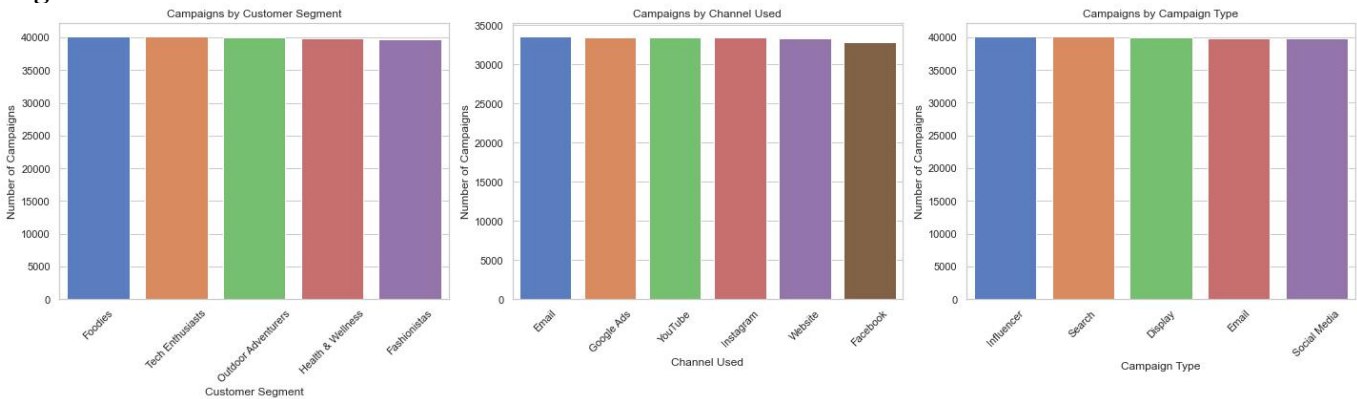
Bivariate Analysis

I analyzed relationships between variables:



- ✓ **Clicks vs. Impressions:** Strong linear relationship (higher impressions = higher clicks).
- ✓ **CPC vs ROI:** Negative correlation — lower cost per click yielded higher ROI.
- ✓ **Conversion Rate vs. Engagement Score:** Positive trend observed.

Segment-Based Breakdown



- ✓ **Customer Segments:** Foodies and Outdoor Adventurers showed high conversion rates.
- ✓ **Channel Use:** Email campaigns had the highest engagement.
- ✓ **Campaign Types:** Influencer and Display ads showed slightly better ROI.

## FEATURE ENGINEERING

To enable more insightful analysis, we engineered the following features:

Feature	Formula	Description
CTR	Clicks / Impressions	Measures ad engagement
CPC	Acquisition Cost / Clicks	Cost per each user click
Profit	ROI * Acquisition Cost	Estimated campaign return
Campaign Month	Extracted from Date	For trend analysis
Campaign Week	ISO Week from Date	Weekly comparison

## PERFORMANCE KPIS & DAX MEASURES

Calculated KPIs in Power BI (using DAX):

CTR =  $\text{DIVIDE}(\text{SUM}('Campaigns'[Clicks]), \text{SUM}('Campaigns'[Impressions]))$

CPC =  $\text{DIVIDE}(\text{SUM}('Campaigns'[Acquisition cost]), \text{SUM}('Campaigns'[Clicks]))$

Total Campaigns =  $\text{DISTINCTCOUNT}('Campaigns'[Campaign ID])$

Average ROI =  $\text{AVERAGE}('Campaigns'[ROI])$

Total Conversions =  $\text{SUMX}('Campaigns', 'Campaigns'[Conversion rate] * 'Campaigns'[Impressions])$

These metrics powered our visuals and made cross-filtering by date, company, and channel seamless.

## POWER BI DASHBOARD STRUCTURE

The dashboard was structured into **3 pages**, each targeting a specific stakeholder view:

### Page 1: Executive Overview

KPI Cards (ROI, CTR, CPC, Conversions)

ROI & Conversion Rate Trend (Line Chart)

ROI by Campaign Type (Bar Chart)

Top Campaigns (Bar Chart)

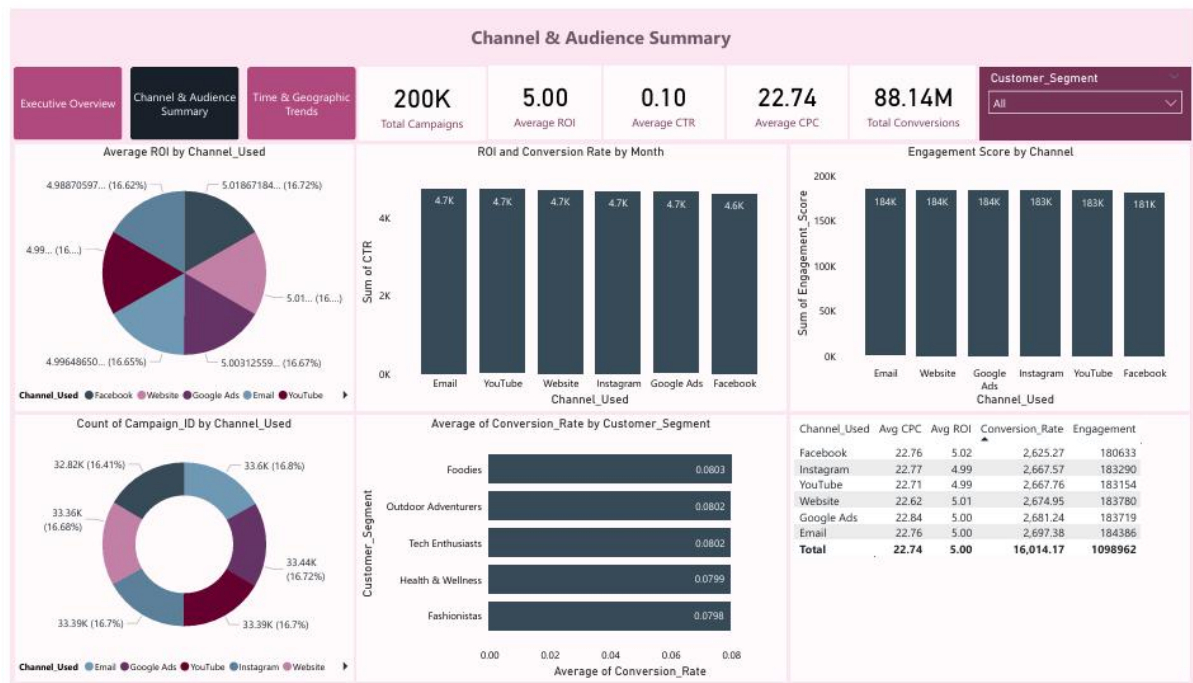
CPC vs ROI (Scatter Plot)

ROI by Company (Column Chart)



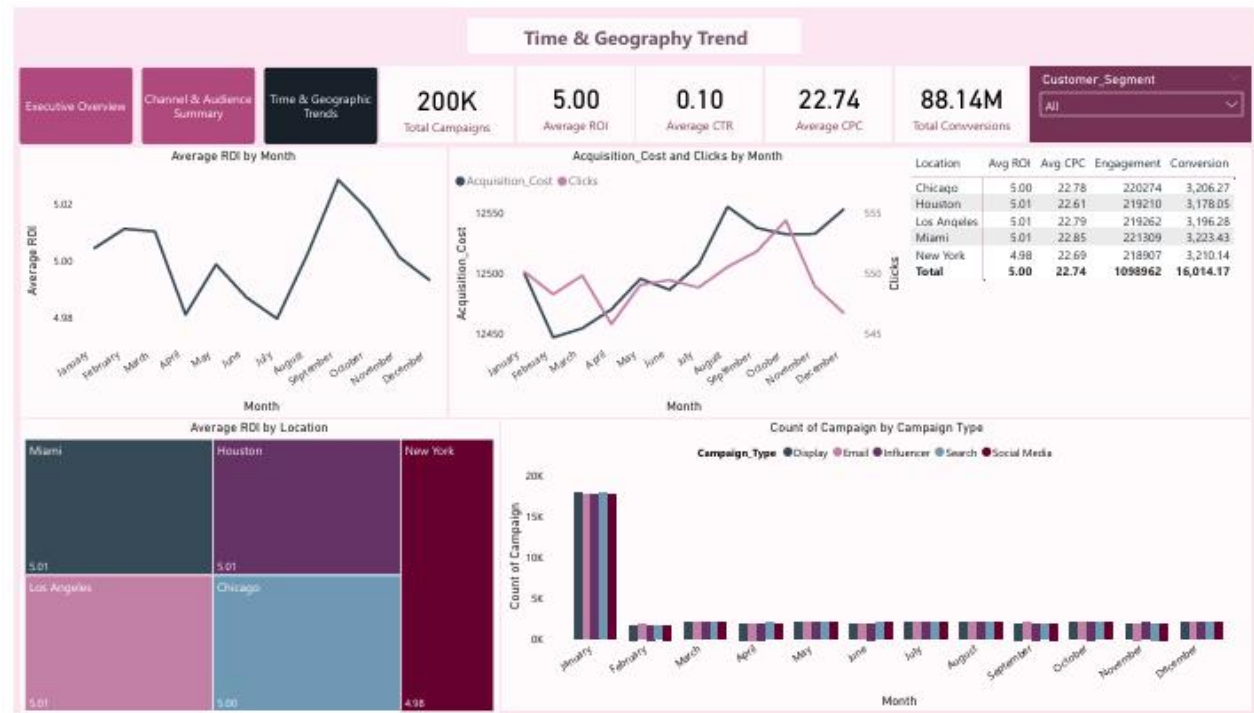
Page 2: Channel & Audience Insights

- ROI by Channel (Bar Chart)
- Engagement Score by Channel (Bar Chart)
- Conversion Rate by Customer Segment (Bar Chart)
- CPC Consistency (Column Chart)
- Campaign Volume by Channel (Bar Chart)
- Summary Table: ROI, Engagement, CPC



Page 3: Time & Geographic Analysis

- ROI Over Time (Line Chart)
- Monthly Engagement Score (Line Chart)
- Campaign Volume by Month (Column Chart)
- Conversion Trend (Line Chart)
- Customer Segment Over Time (Bar Chart)
- Summary Table (Date & Segment KPI View)





## DETAILED INSIGHTS & OBSERVATIONS

- ✓ **High ROI Consistency Across Channels:** ROI hovered around 5.00 for most high-usage channels like Facebook, Email, and Google Ads. This suggests a balanced return despite differences in campaign volume or engagement scores.
- ✓ **High Engagement Doesn't Always Equal High ROI:** Although Email campaigns topped the chart in engagement, some of them underperformed in ROI due to high CPC or low conversions.
- ✓ **Stable CPC Across Channels:** The acquisition cost per click remained consistently between \$22.70 and \$22.85 across nearly all channels, indicating budget standardization, but highlighting that other variables (engagement and targeting) drive success.
- ✓ **Conversion Funnel Drop-off:** Many campaigns had strong impressions and click volume but saw a steep drop-off at the conversion stage, suggesting optimization is needed for landing pages or follow-up actions.
- ✓ **Customer Segments Influence Outcomes:** Segments like "Foodies" and "Outdoor Adventurers" consistently showed high conversion rates. Segments like "Budget Shoppers" and "Tech Savvy Users" had high impressions but relatively low conversions.
- ✓ **Time-based Variability:** ROI and engagement were highest in January and February, with noticeable drops in mid-year months. This may align with seasonal marketing campaigns.

## KEY FINDINGS

Area	Observation
ROI Distribution	Most campaigns performed within a tight range (~4.98 to 5.02)
Best Channels	Email, Facebook, and Google Ads had high ROI and strong reach
Top Segments	Foodies and Outdoor Adventurers had best conversion rates (~8%)
Weakness Areas	Low conversions in segments like Budget Shoppers and Luxury Seekers
Cost Efficiency	CPC was stable; ROI driven more by engagement and relevance
Time of Year	Q1 had higher engagement and ROI; campaigns declined by mid-year
Campaign Format	Influencer and Search campaigns had slight ROI advantages

## RECOMMENDATIONS

- ✓ **Double Down on High-Performing Channels:** Invest more in Facebook and Email where ROI and engagement scores are strong.
- ✓ **Target Niche Segments More Precisely:** Focus on Foodies and Outdoor Adventurers to maximize conversion efficiency.
- ✓ **Improve Conversion Funnel:** Analyze the journey after the click. Enhance landing page experience or post-click follow-up strategies.
- ✓ **Time Campaigns Strategically:** Launch high-budget campaigns during Q1 where engagement and ROI peak.
- ✓ **Re-evaluate Underperforming Segments:** Consider redesigning content or retargeting strategies for segments with high traffic but low conversion.
- ✓ **Monitor Beyond CPC:** Since cost is stable, success lies in optimizing engagement and audience targeting instead of just spend control.

## CONCLUSION

This marketing campaign analysis uncovered actionable insights that can guide strategic marketing decisions. Using a combination of Python, Power BI, and DAX, the analysis explored campaign performance across channels, audience segments, and time.

The results show that **strategic targeting**, **audience segmentation**, and **timing** matter more than just budget allocation. Campaigns that engaged well and were timed around Q1 consistently performed better. Furthermore, channel selection and creative execution have a significant influence on ROI.

The accompanying Power BI dashboard provides an interactive way for stakeholders to explore these insights and monitor performance metrics dynamically.

## FUTURE WORK

- ✓ To enhance and extend this analysis:
- ✓ Develop a **predictive model** to forecast campaign ROI based on channel, segment, and timing.
- ✓ Add **real-time data integration** using Power BI Service and scheduled data refreshes.
- ✓ Expand the dataset to include **textual analysis** of campaign copy and creative elements.
- ✓ Conduct **A/B testing simulations** based on top-performing combinations.
- ✓ Introduce an ROI simulator to help marketing teams plan campaign scenarios.