

Analysis of Campaign Performance Using SQL

Introduction

In the competitive landscape of digital marketing, companies are increasingly leveraging data to fine-tune their advertising strategies and maximize their return on investment (ROI). This report explores the performance of digital advertising campaigns across various platforms using SQL to analyze key metrics. By assessing variables such as impressions, clicks, conversion rates, acquisition costs, and ROI, we aim to uncover patterns that can help improve campaign performance. Through this analysis, we will provide valuable insights on optimizing ad spend, identifying high-performing channels, and determining the most cost-effective campaigns.

Objectives

1. To familiarize with the dataset, review its structure, and identify key variables crucial for analyzing digital marketing campaigns.
2. To calculate essential metrics like click-through rates (CTR), total impressions, conversions, and cost per conversion, allowing for performance evaluation.
3. To rank campaigns by their effectiveness, focusing on ROI, conversion rates, and engagement scores to determine the most successful campaigns.
4. To identify the top-performing channels by analyzing total conversions and impressions, providing a clear understanding of the most effective advertising platforms.
5. To evaluate and compare the cost-effectiveness of campaigns to ensure optimal budget allocation and maximize returns.
6. To provide actionable recommendations based on the data analysis to enhance future digital marketing strategies.

Tools

The following tools were used for data retrieval, analysis, and documentation:

- **Microsoft Excel** for storing the dataset
- **PostgreSQL** for SQL query execution.
- **Google Drive** for storing SQL scripts and reports.

Data Source:

As part of my internship at HNG, I was supplied with a [Marketing Campaign Dataset](#) in CSV format. To better understand the data, I first loaded it into SQL for exploration and analysis. This step allowed me to familiarize myself with the dataset structure, identify key metrics, and prepare for deeper insights. The goal of my analysis is to extract actionable insights that will guide stakeholders in optimizing their marketing strategies and ad spend.

Data Understanding:

Firstly I had to create a table in PostgreSQL called `campaigndata` to house my data and define the data types for the columns.

Query Query History

```
1  ✓ CREATE TABLE campaigndata(  
2    Campaign_ID VARCHAR(6),  
3    Company VARCHAR(20),  
4    Campaign_Type VARCHAR(12),  
5    Target_Audience VARCHAR(11),  
6    Duration VARCHAR(7),  
7    Channel_Used VARCHAR(10),  
8    Conversion_Rate NUMERIC(1,2),  
9    Acquisition_Cost MONEY,  
10   ROI NUMERIC(1,2),  
11   Location VARCHAR(11),  
12   Date DATE,  
13   Clicks INTEGER,
```

Data Output Messages Notifications

CREATE TABLE

Query returned successfully in 1 secs 293 msec.

Then I imported the data in SQL.

Import/Export data - table 'campaigndata'

General Options Columns

Import/Export ☒ Import ☐ Export

Filename C:\Users\TITI\Desktop\John\HNG Internship\Stage 3\marketing_camp

Format csv

Encoding Select an item...

Close Reset OK

After that, I had to review and inspect the dataset structure to understand available fields and data types and ensure that the data types (e.g., numeric, text, date) are appropriate for analysis.

39	-- Overview of the dataset
40	SELECT *
41	FROM campaigndata;
42	

Data Output	Messages	Notifications
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									SQL
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	campaign_id character varying (6)	company character varying (20)	campaign_type character varying (12)	target_audience character varying (11)	duration character v
1	1	Innovate Industries	Email	Men 18-24	30 days
2	2	NexGen Systems	Email	Women 35-44	60 days
3	3	Alpha Innovations	Influencer	Men 25-34	30 days
4	4	DataTech Solutions	Display	All Ages	60 days
5	5	NexGen Systems	Email	Men 25-34	15 days
6	6	DataTech Solutions	Display	All Ages	15 days
7	7	NexGen Systems	Email	Women 35-44	60 days
8	8	DataTech Solutions	Search	Men 18-24	45 days
9	9	Alpha Innovations	Social Media	Women 35-44	15 days
10	10	TechCorp	Email	Women 35-44	15 days

Total rows: 200005	Query complete 00:00:01.175
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Based on the sample data provided and the available fields in the dataset, here's an overview:

The dataset includes the following columns:

- Company** (Text): Name of the company running the campaign.
- Campaign_Type** (Text): The type of campaign (e.g., Email, Display, Social Media).
- Target_Audience** (Text): Demographic targeting for the campaign (e.g., Men 18-24, Women 35-44).
- Duration** (Text): The duration of the campaign (e.g., 30 days, 60 days).
- Channel_Used** (Text): The advertising channel/platform used (e.g., Google Ads, YouTube, Instagram).

6. **Conversion_Rate** (Numeric): The conversion rate for the campaign, a decimal number (e.g., 0.04).
7. **Acquisition_Cost** (Money): The total cost of acquiring customers through the campaign, in monetary units (e.g., \$16,174.00).
8. **ROI** (Numeric): Return on Investment (ROI) for the campaign, expressed as a numeric value (e.g., 6.29).
9. **Location** (Text): Geographic location where the campaign was targeted (e.g., Chicago, New York).
10. **Date** (Date): The date when the campaign started (e.g., 1/1/2021).
11. **Clicks** (Integer): The total number of clicks generated by the campaign.
12. **Impressions** (Integer): The total number of impressions generated by the campaign.
13. **Engagement_Score** (Integer): A numeric score representing engagement for the campaign (e.g., 6, 7, 10).
14. **Customer_Segment** (Text): The specific customer segment targeted by the campaign (e.g., Health & Wellness, Fashionistas).

The key variables I'll be focusing on for my analysis are:

1. **Impressions** (Integer):
 - Represents the number of times an ad is shown to users. This is essential for calculating metrics like CTR (Click-Through Rate) and evaluating the reach of campaigns.
2. **Clicks** (Integer):
 - Represents the number of times users clicked on the ad. This, combined with Impressions, is critical for calculating CTR and understanding campaign engagement.
3. **Conversion_Rate** (Numeric):

- Indicates the proportion of clicks that result in a desired outcome (e.g., purchase, sign-up). This helps assess campaign effectiveness in driving action.

4. **Acquisition_Cost** (Money):

- Reflects the cost incurred for acquiring each customer or conversion. This is key to evaluating the cost-effectiveness of campaigns.

5. **ROI** (Numeric):

- Reflects the return generated from the investment in a campaign. Analyzing ROI is essential for understanding the profitability of campaigns.

Analysis & Query Writing

The following are questions that will guide my analysis and how I use SQL to extract insights from my data:

1. Calculate Total Impressions for Each Campaign

```
18 -- 1. • Calculate the Total Impressions for Each Campaign
19 v SELECT Campaign_ID, SUM(Impressions) AS totalimpressions
20 FROM campaigndata
21 GROUP BY Campaign_ID
22 ORDER BY totalimpressions DESC;
```

Data Output Messages Notifications

	campaign_id character varying (6)	totalimpressions bigint
1	8905	10000
2	17981	10000
3	26806	10000
4	29381	10000
5	55996	10000
6	12705	10000
7	60573	10000
8	73109	10000
9	71869	10000
10	43755	10000
11	26042	10000
Total rows: 200005 Query complete 00:00:00.750		

There were 200,005 campaigns that were run in the data, that's a lot of campaigns and 10,000 impressions was the highest impressions gotten.

2. Identify the Campaign with the Highest ROI

```
18 -- 2. • Identify the Campaign with the Highest ROI
19 v SELECT Campaign_ID, Company, ROI
20 FROM campaigndata
21 ORDER BY ROI DESC
22 LIMIT 1;
```

Data Output

Messages










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Campaign with the Id 168 had the highest ROI(Return on Investment) at 800% and the company that ran that campaign is NextGen Systems. This means that for every \$1 spent, the campaign generated \$8 in return.

3. Find the Top 3 Locations with the Most Impressions

```
17 -- 3. • Find the Top 3 Locations with the Most Impressions
18 v SELECT Location, SUM(Impressions) AS TotalImpressions
19 FROM campaigndata
20 GROUP BY Location
21 ORDER BY TotalImpressions DESC
22 LIMIT 3;
```

Data Output	Messages	Notifications
<div></div>		
	location character varying (11)	totalimpressions bigint
1	New York	221359756
2	Miami	221347726
3	Chicago	219999352

New York is the location with the highest Impressions at 221.35 million impressions followed by Miami with 221.34 million impressions and Chicago is the least of the top 3 locations with 219 million impressions.

4. Calculate Average Engagement Score by Target Audience

```
18 -- 4. • Calculate Average Engagement Score by Target Audience
19 v SELECT Target_Audience, AVG(Engagement_Score) AS avgengagementscore
20 FROM campaigndata
21 GROUP BY Target_Audience
22 ORDER BY avgengagementscore DESC
```

Data Output Messages Notifications

	target_audience character varying (11) 🔒	avgengagementscore numeric 🔒
1	Men 18-24	5.5150152760873345
2	Women 25-34	5.4927398595456477
3	Men 25-34	5.4919798121127324
4	All Ages	5.4868693935683766
5	Women 35-44	5.4865702479338843

On average, Men between 18-24 have the highest average engagement score (5.5150), meaning they interact the most with the marketing campaigns.

Women between 25-34 come next with an engagement score of 5.4927, closely followed by Men 25-34 at 5.4918.

All other ages group have an engagement score of 5.4868, suggesting that the overall audience has a relatively high interaction rate.

Women between 35-44 have the lowest engagement score among the top five, at 5.4865, but the difference between groups is minimal

5. Calculate the Overall CTR (Click-Through Rate)

```
20 -- 5. • Calculate the Overall CTR (Click-Through Rate)
21 SELECT (SUM(Clicks) * 100.0) / SUM(Impressions) AS OverallCTR
22 FROM campaigndata;
```

Data Output Messages Notifications



	overallctr numeric	
1	9.9826390633686225	

This indicates that for every 100 impressions, roughly 9.98 users clicked on the ad. This is a solid Click Through Rate, suggesting that the ads are relatively effective at driving user interaction compared to the industry average, where CTRs tend to hover around 2-3% for most digital platforms.

6. Find the Most Cost-Effective Campaign

```
18 -- 6. • Find the Most Cost-Effective Campaign - costperconversion = acquisition_cost / conversions
19 SELECT Campaign_ID, Company,
20        (CAST(REPLACE(REPLACE(Acquisition_Cost::TEXT, '$', ''), ',','')) AS NUMERIC) AS CostPerConversion
21 FROM campaigndata
22 ORDER BY CostPerConversion ASC;
```

Data Output Messages Notifications

	campaign_id character varying (6)	company character varying (20)	costperconversion numeric
1	118451	Alpha Innovations	34.2177554438860972
2	126810	Alpha Innovations	34.7339512530037762
3	166	NexGen Systems	34.7494989979959920
4	15367	Innovate Industries	34.9368816103718867
5	41553	TechCorp	34.9795081967213115
6	101103	Alpha Innovations	34.9912556838055264
7	58207	Innovate Industries	35.0627615062761506
8	82721	DataTech Solutions	35.1263412945655936
9	110133	NexGen Systems	35.3459119496855346
10	125143	NexGen Systems	36.0824045930428909
11	18320	NexGen Systems	36.1428571428571429
Total rows: 200005		Query complete 00:00:01.658	

Campaign with id 118451 from Alpha Innovations has the lowest cost per conversion at \$34.22 which makes it the most cost effective campaign. This means that for every successful conversion, Alpha Innovations spent approximately \$34.22, making it the most efficient campaign. Alpha Innovations has three campaigns in the top six most cost-effective campaigns, 3 of the campaigns they ran were among the most cost effective.

7. Find Campaigns with CTR Above a Threshold

```
14 -- 7. • Find Campaigns with CTR Above a Threshold - the threshold is 5% i
15 v SELECT
16     Campaign_ID,
17     Company,
18     (SUM(Clicks) * 100.0) / SUM(Impressions) AS CTR
19 FROM campaigndata
20 GROUP BY Campaign_ID, Company
21 HAVING (SUM(Clicks) * 100.0) / SUM(Impressions) > 5
22 ORDER BY CTR DESC;
23
```

Data Output Messages Notifications

	campaign_id character varying (6)	company character varying (20)	ctr numeric
1	122375	TechCorp	99.2023928215353938
2	26330	Alpha Innovations	99.2000000000000000
3	133972	Innovate Industries	99.0049751243781095
4	121860	Alpha Innovations	99.0009990009990010
5	171192	Alpha Innovations	98.4047856430707876
6	65535	DataTech Solutions	98.3218163869693978
7	77443	Innovate Industries	98.1280788177339901
8	173975	NexGen Systems	97.2194637537239325
9	67651	DataTech Solutions	97.0472440944881890
10	14262	TechCorp	96.9902912621359223
11	63985	NexGen Systems	96.9518190757128810

Total rows: 160332

Query complete 00:00:01.536

Campaign with id 123375 had the highest click through rate at 99.2%. The top 10 campaigns shown have extremely high CTRs, ranging from 99.2% down to 96.9%. This suggests that these campaigns were very effective at getting people to click.

TechCorp appear 2 times and Alpha Innovations appear 3 times in the top 10, indicating they are running highly effective campaigns that generate high click-through rates.

8. Rank Channels by Total Conversions

```
17 SELECT
18     channel_used,
19     SUM(clicks * conversion_rate) AS totalconversions
20 FROM campaigndata
21 GROUP BY channel_used
22 ORDER BY totalconversions DESC;
```

Data Output

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SQL

	channel_used character varying (10)	totalconversions numeric
1	Email	1485393.65
2	Website	1477746.31
3	Google Ads	1468813.81
4	YouTube	1463620.81
5	Instagram	1462864.48
6	Facebook	1446294.86

Email has the highest number of total conversions (1,485,393.65) and is ranked 1st.

Website and Google Ads have very similar total conversions and are ranked 2nd and 3rd, respectively.

YouTube and Instagram also have close total conversion numbers and are ranked 4th and 5th.

Facebook has the lowest number of conversions among the displayed channels and is ranked 6th.

Email, Website, and Google Ads are the most effective channels for driving conversions.

Conclusion

The analysis of the 200,005 campaigns provides valuable insights into the effectiveness of various digital marketing efforts. Key findings indicate that NextGen Systems achieved the highest Return on Investment (ROI) at 800%, demonstrating strong revenue generation. In terms of reach, New York, Miami, and Chicago led in impressions, with over 219 million impressions each.

Engagement trends revealed that men aged 18-24 had the highest interaction with ads, closely followed by women aged 25-34. Overall, the audience engagement scores were consistently high across all age groups. The overall Click-Through Rate (CTR) stood at 9.98%, significantly exceeding industry averages, highlighting strong user interest in the ads.

Cost-effectiveness analysis identified Alpha Innovations as the top performer, with a cost per conversion of \$34.22. Additionally, TechCorp and Alpha Innovations ran some of the highest CTR campaigns, exceeding 96.9%, proving their ability to drive clicks effectively.

Finally, Email emerged as the top channel for conversions, followed by Website and Google Ads, emphasizing the importance of direct marketing and search-driven strategies. Facebook, while ranking lowest in conversions, still played a role in the overall digital marketing mix.

These insights offer a strategic direction for optimizing future campaigns by prioritizing high-performing channels, refining audience targeting, and leveraging cost-efficient strategies to maximize ROI and engagement.