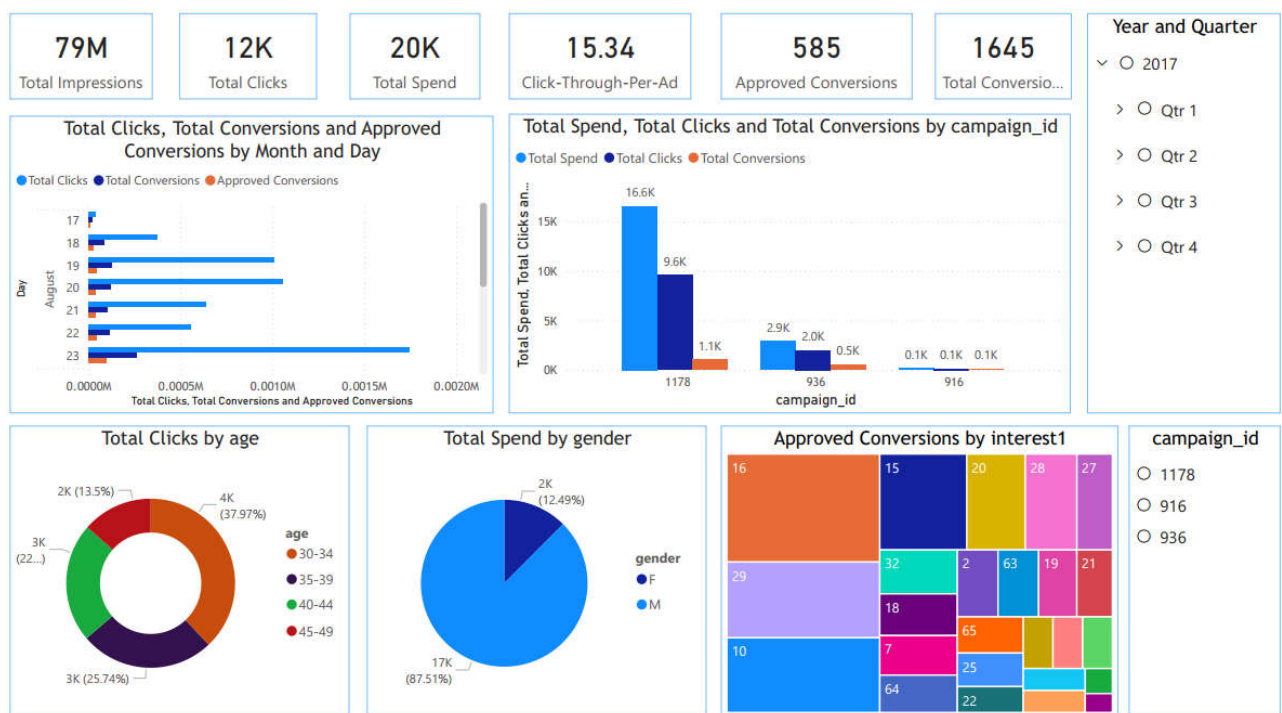


TASK 02 - SOCIAL MEDIA CAMPAIGN PERFORMANCE ANALYSIS DATA SCIENCE & ANALYTICS INTERNSHIP

Project Title: Facebook Ad Campaign Performance Tracker Using Power BI



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Submitted To: Future Interns - Data Science & Analytics Program

November, 2025

TABLE OF CONTENTS

LIST OF FIGURES ii

1. Introduction 1

2. Dataset Overview..... 1

3. Data Cleaning Process2

 3.1. Removal of empty and irrelevant rows2

 3.2. Standardization of text fields.....2

 3.3. Data type corrections2

 3.4. Handling missing values.....2

 3.5. Validation of numeric KPIs2

 3.6. Exporting the cleaned dataset2

4. Dashboard KPIs and DAX Measures3

 4.1. Primary Metrics.....3

 4.2. Engagement Metrics3

 4.3. Conversion Metrics.....3

5. Visual Analysis Summary4

 5.1. Campaign Performance Trends4

 5.2. Demographic Insights.....4

 5.3. Interest Group Behavior5

 5.4. Conversion Dynamics.....5

 5.5. Suggested Visual Placement for Final Report.....5

6. Insights and Strategic Recommendations7

7. Conclusion8

LIST OF FIGURES

Figure 5-1. Illustration of Dashboard Utilizing Few KPI’s4

Figure 5-2. Illustration of Summarized KPI5

Figure 5-3. Trend of Total Clicks, Total conversion Vs Month5

Figure 5-4. Total Clicks by Age6

Figure 5-5. Total Spend by Gender6

Figure 5-6. Approved Conversions Vs Interest 17

1. Introduction

This report provides a comprehensive and detailed analysis of the *Facebook Ad Campaign* dataset as part of Task 02 of the Data Science & Analytics Internship. The objective of this task was to assess campaign performance through a multi-layered analytical approach, leveraging Power BI for data transformation, modeling, visualization, and interpretation.

The analysis examines critical digital marketing KPIs, demographic segmentation, interest-based engagement patterns, and cost efficiency metrics. A dynamic, interactive dashboard was developed to support insight-driven decision-making and improve the optimization strategies of future campaigns.

Digital advertising campaigns rely on continuous measurement to ensure investment efficiency, audience relevance, and conversion effectiveness. This report demonstrates how the combination of Power BI and analytical techniques can transform raw advertising data into actionable insights.

2. Dataset Overview

The dataset used in this analysis contains multiple fields extracted from Facebook's advertising platform. These fields represent user engagement metrics, demographic attributes, campaign identifiers, and conversion performance. The dataset includes:

- **ad_id** - Unique reference number for an ad
- **reporting_start & reporting_end** - Timeframe for each report
- **campaign_id & fb_campaign_id** - Grouping identifiers
- **age** - User age category
- **gender** - Audience gender
- **interest1, interest2, interest3** - Audience interest groups
- **impressions** - Total ad views
- **clicks** - Total number of user interactions
- **spent** - Total advertising expenditure
- **total_conversion** - Overall conversion count
- **approved_conversion** - Verified conversion count

These fields allow for deep segmentation across age, gender, interest categories, and campaign lineage, providing a rich foundation for marketing performance analysis.

3. Data Cleaning Process

A thorough data cleaning pipeline was implemented using Power Query to ensure data quality and analytic readiness. The major cleaning steps included:

3.1. Removal of empty and irrelevant rows

Empty rows and entries lacking core metrics were removed to preserve analytical integrity.

3.2. Standardization of text fields

The **Trim** and **Clean** transformations were applied across demographic and categorical fields to eliminate spacing inconsistencies and non-printable characters.

3.3. Data type corrections

Appropriate types were assigned:

- **Date fields** → Date
- **Numeric metrics** → Whole/Decimal
- **Identifiers** → Text

3.4. Handling missing values

- Missing numeric values were replaced with zero.
- Missing demographic entries were retained to avoid misrepresentation in segmentation charts.

3.5. Validation of numeric KPIs

Ensured that impressions, clicks, conversions, and spend were consistent and suitable for calculation of DAX-based measures.

3.6. Exporting the cleaned dataset

A clean output file named **facebook_ad_campaign_cleaned.csv** was generated to be used for modeling and visualization.

This cleaning pipeline enhanced the reliability of insights and ensured smooth dashboard functionality.

4. Dashboard KPIs and DAX Measures

A suite of critical marketing KPIs was computed using DAX to support deeper campaign performance evaluation. These include:

4.1. Primary Metrics

- **Total Impressions** - Indicates how widely ads were viewed
- **Total Clicks** - Measures user response
- **Total Spend** - Cost incurred

4.2. Engagement Metrics

- **CTR (Click-Through Rate)** = $\text{Clicks} \div \text{Impressions}$
- **CPC (Cost per Click)** = $\text{Spend} \div \text{Clicks}$
- **CPM (Cost per 1000 Impressions)**

4.3. Conversion Metrics

- **Total Conversions**
- **Approved Conversions**
- **Conversion Rate** = $\text{Conversions} / \text{Clicks}$
- **Approval Rate** = $\text{Approved Conversions} / \text{Total Conversions}$

These KPIs form the backbone of the dashboard and allow marketers to evaluate campaign effectiveness across multiple dimensions.

5. Visual Analysis Summary

Based on the dashboard visuals, several notable trends and behavioral patterns emerged:

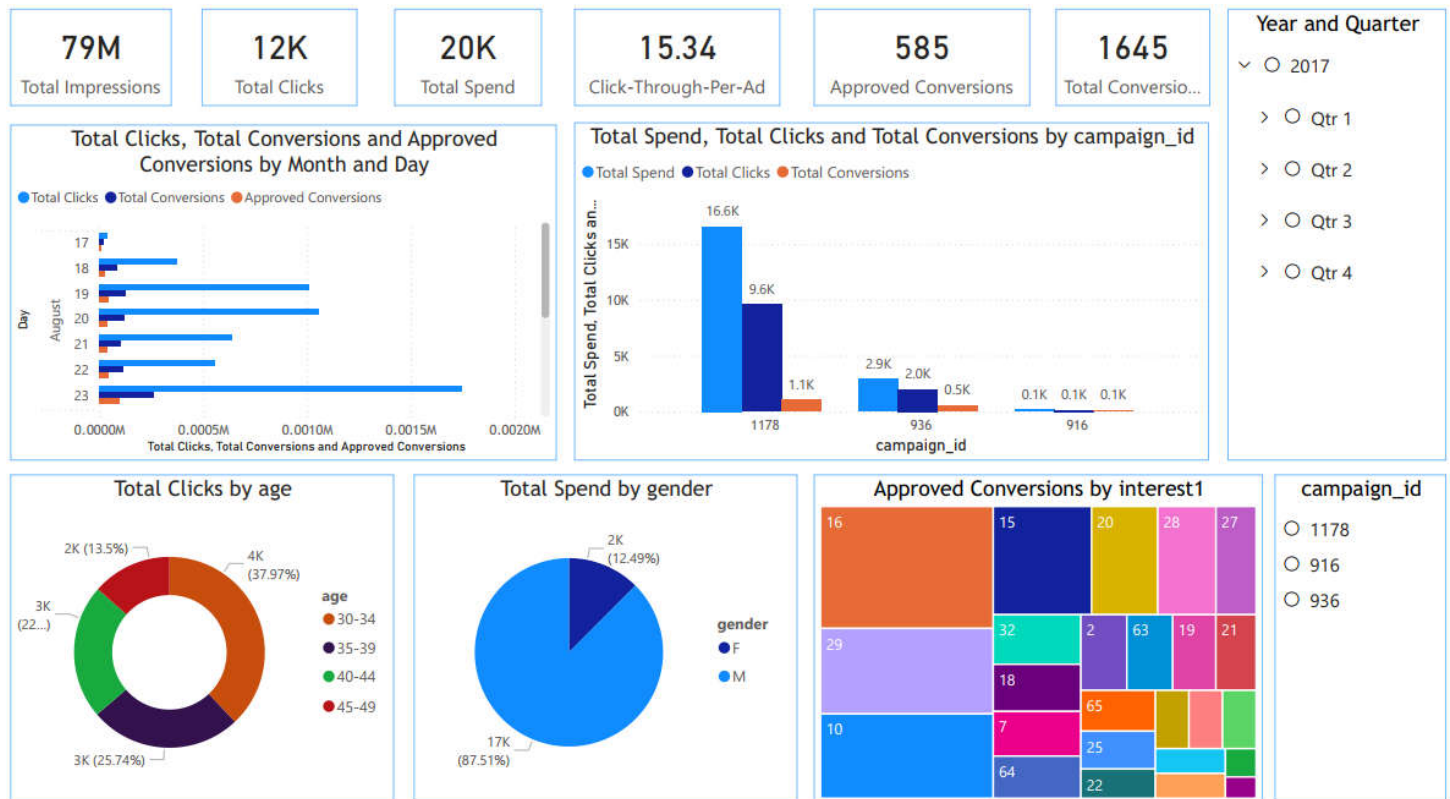


Figure 5-1. Illustration of Dashboard Utilizing Few KPI's

5.1. Campaign Performance Trends

- Ad spend and impressions showed a **strong positive correlation**, confirming budget influence on ad visibility.
- However, **high impressions did not always translate to high clicks**, suggesting varying creative performance.

5.2. Demographic Insights

- Users aged **30-34** and **35-39** generated the strongest engagement levels.
- Female audiences accounted for a significantly larger portion of spend and conversions.

5.3. Interest Group Behavior

- Certain interest categories (Interest 1, Interest 3) displayed high conversion output, revealing their marketing potential.
- Lower-performing interests require attention or retargeting strategies.

5.4. Conversion Dynamics

- A noticeable difference between **total** and **approved conversions** indicates potential validation issues in the conversion funnel.

5.5. Suggested Visual Placement for Final Report

You may insert your exported visuals from Power BI at the following recommended locations:

- KPI Summary Visual

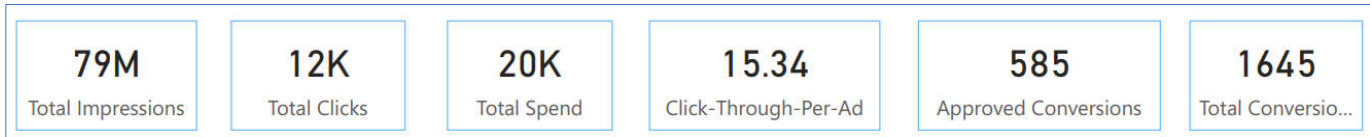


Figure 5-2. Illustration of Summarized KPI

- Trend Analysis Graph

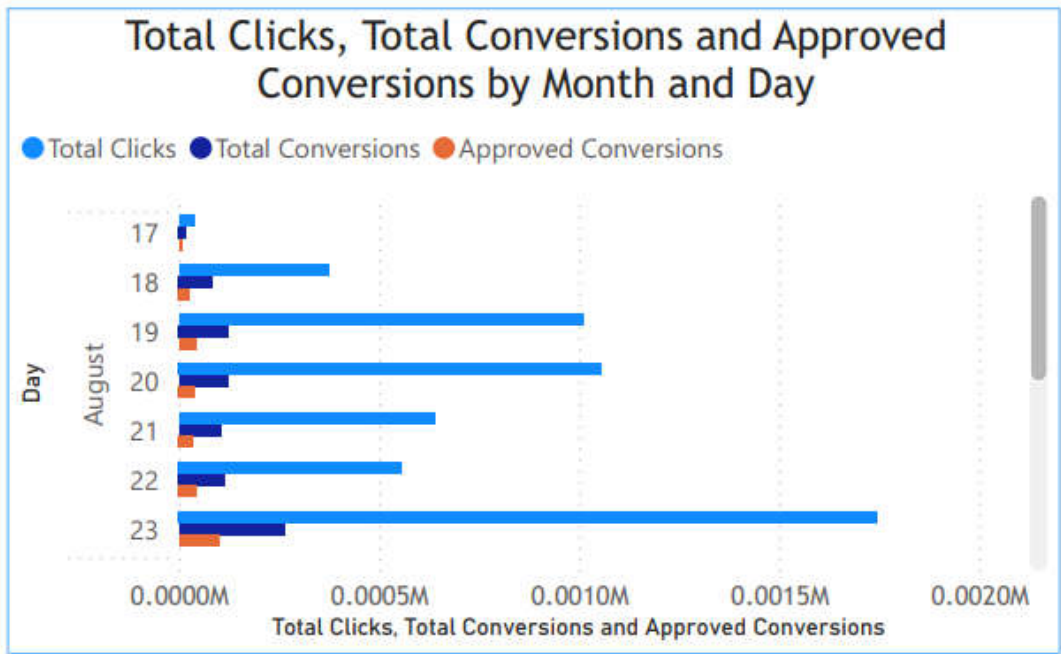


Figure 5-3. Trend of Total Clicks, Total conversion Vs Month

- Age Group Click Distribution Chart

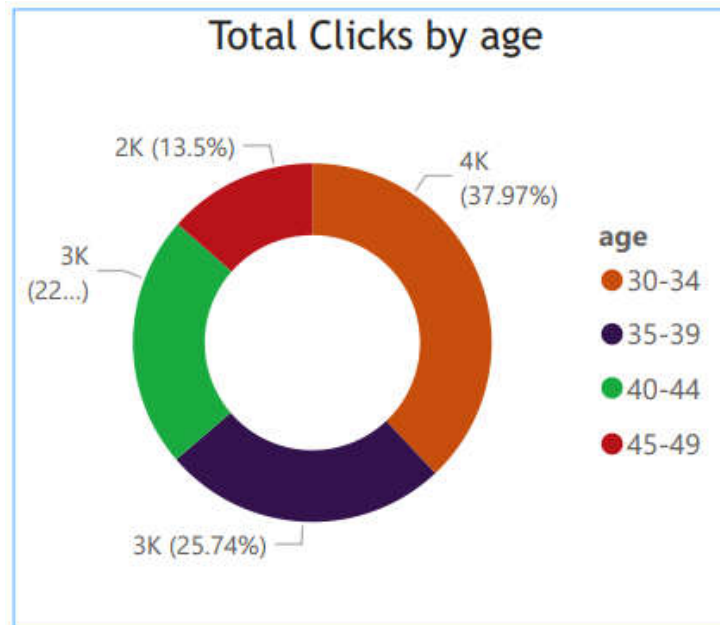


Figure 5-4. Total Clicks by Age

- Gender Spend Comparison Chart

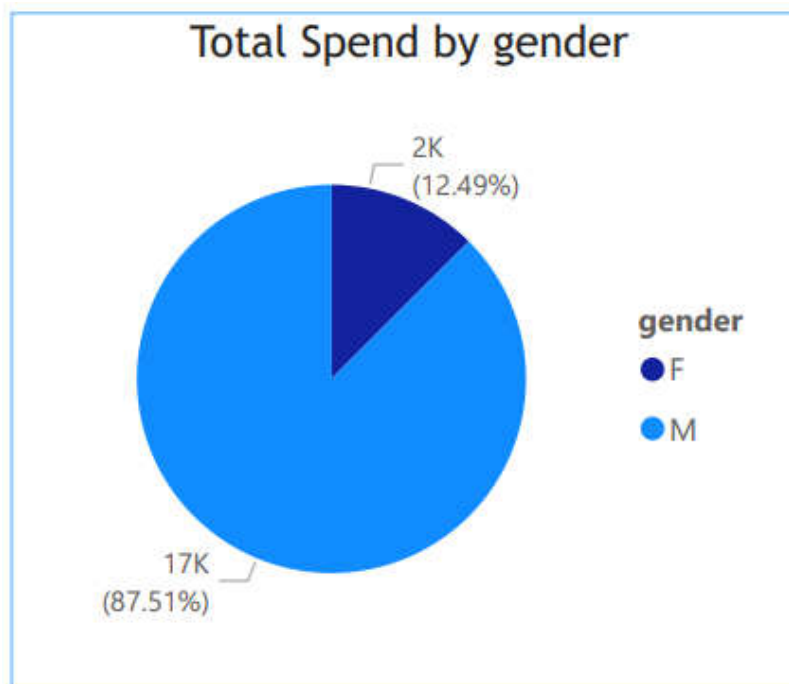


Figure 5-5. Total Spend by Gender

- Interest-Based Conversion Chart

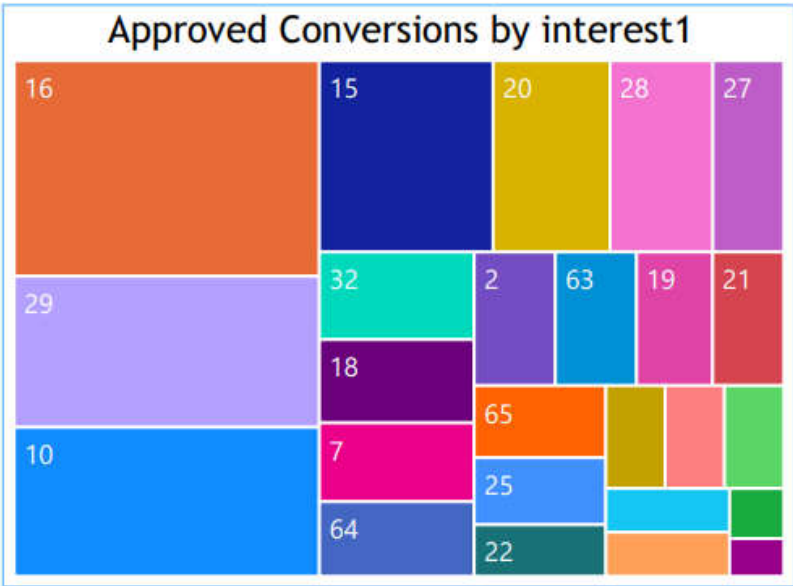


Figure 5-6. Approved Conversions Vs Interest 1

6. Insights and Strategic Recommendations

Based on the analysis, the following actionable recommendations were developed:

A. Optimize Audience Targeting

Shift budget toward high-performing age groups and interest categories to maximize ROI.

B. Improve Creative and Messaging

Underperforming segments may require refreshed visuals, different content angles, or stronger call-to-action elements.

C. Refine Conversion Approval Processes

The difference between total and approved conversions indicates a bottleneck that needs operational improvement.

D. Reallocate Budget from Low-Performance Ads

Identify ads with high spend but low CTR or conversion efficiency and pause, redesign, or retarget them.

E. Increase A/B Testing

Implement testing across:

- Creative formats
- Demographic segments
- Interest categories
- Device types

This supports continuous optimization and reduces wasted spend.

7. Conclusion

The Facebook Ad Campaign analysis successfully highlights the value of data-driven decision-making in digital marketing. Through structured data cleaning, KPI modeling, segmentation analysis, and dashboard visualization, this task provides a clear picture of campaign strengths and inefficiencies.

The insights and recommendations presented in this report will support improved targeting, optimized spending, and enhanced performance for future advertising campaigns. The Power BI dashboard serves as a dynamic analytical tool, enabling ongoing monitoring and strategy development.