

# Marketing Analytics & GPT-based AI Assistant

## Part 1: Marketing Analytics

### 1. Campaign Performance Analysis

We analyzed campaign-level metrics such as impressions, clicks, conversions, and spend across channels. The distribution of metrics revealed significant right-skew, especially in spend and conversions. After applying log transformation, the data was more normalized for meaningful comparison.

Key performance indicators like **click-through rate (CTR)**, **conversion rate**, and **cost per conversion** were computed. Insights include:

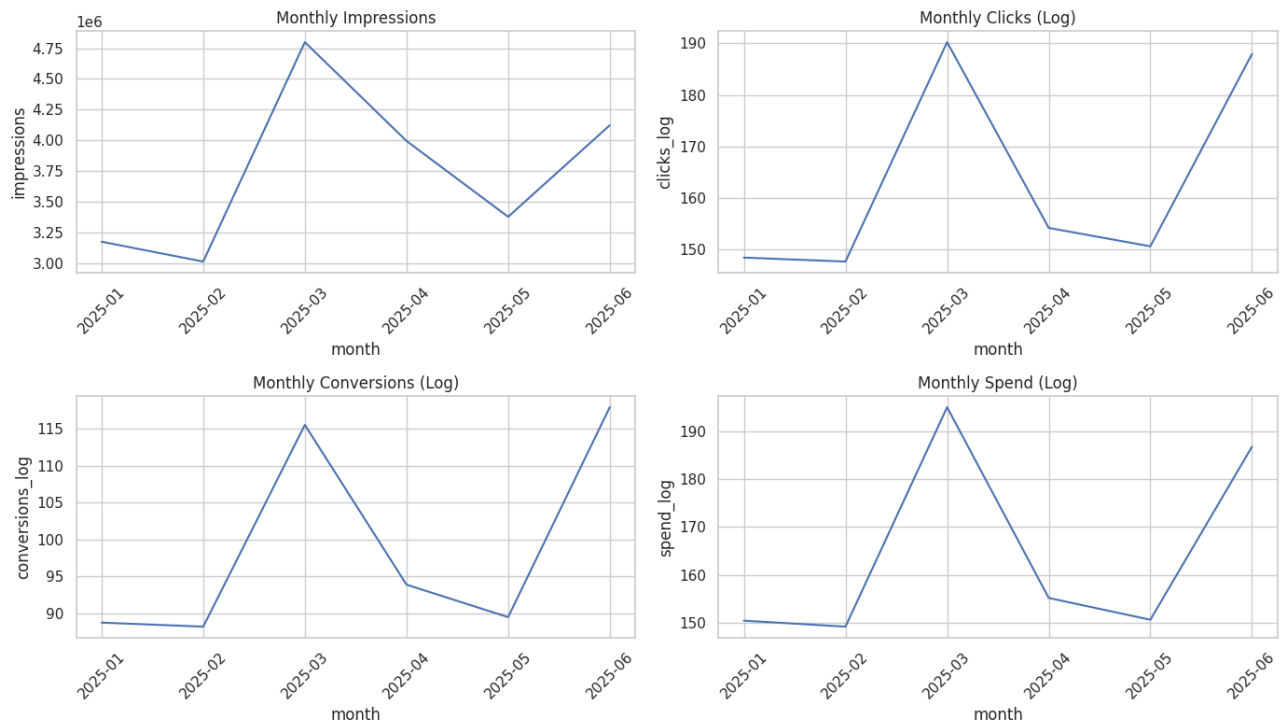
- **Facebook** had the highest conversion rate (~0.61) but the lowest click rate, suggesting high-quality traffic.
- **Twitter** and **Email** had strong conversion efficiency and relatively low cost per conversion.
- **Google Ads** showed the lowest CTR and highest cost per conversion, indicating inefficient spend.

Monthly trends indicated that impressions, clicks, and conversions peaked in **March**, suggesting possible seasonal or campaign-based momentum.

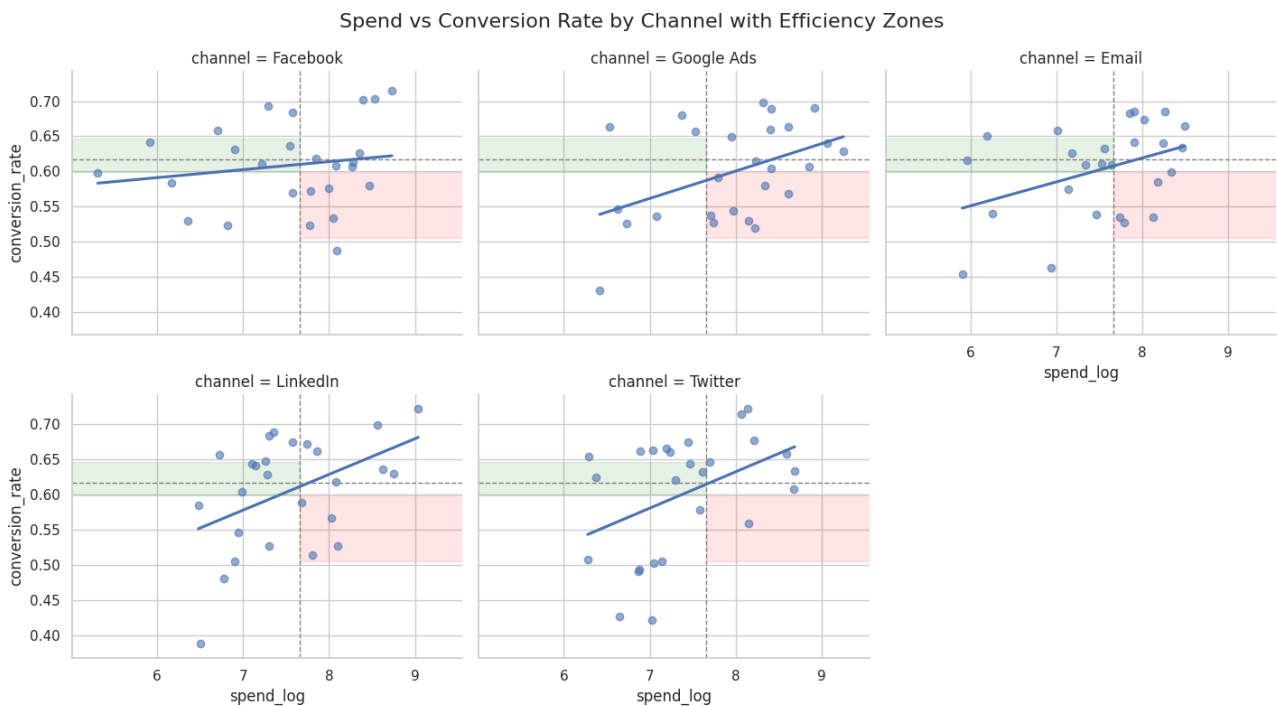
Spend vs. conversion rate plots (with trendlines and efficiency zones) revealed:

- **Twitter and Email** performed well with low to moderate spend.
- **LinkedIn and Google Ads** had inconsistent efficiency, with higher spend not always leading to better conversion.

Channels	Click Rate	Conversion Rate	Cost Per Conversion
Twitter	0.000061	0.601871	1.711782
Email	0.000054	0.602602	1.669211
Linkedin	0.000052	0.605309	1.695141
Facebook	0.000050	0.608587	1.657249
Google Ads	0.000046	0.599341	1.753980



> Above plots show monthly trends of Impressions, Clicks, Conversions, and Spend.



> This annotated plot separates efficient (green) vs. inefficient (red) spend-conversion areas, helping identify which campaigns perform well at lower costs.

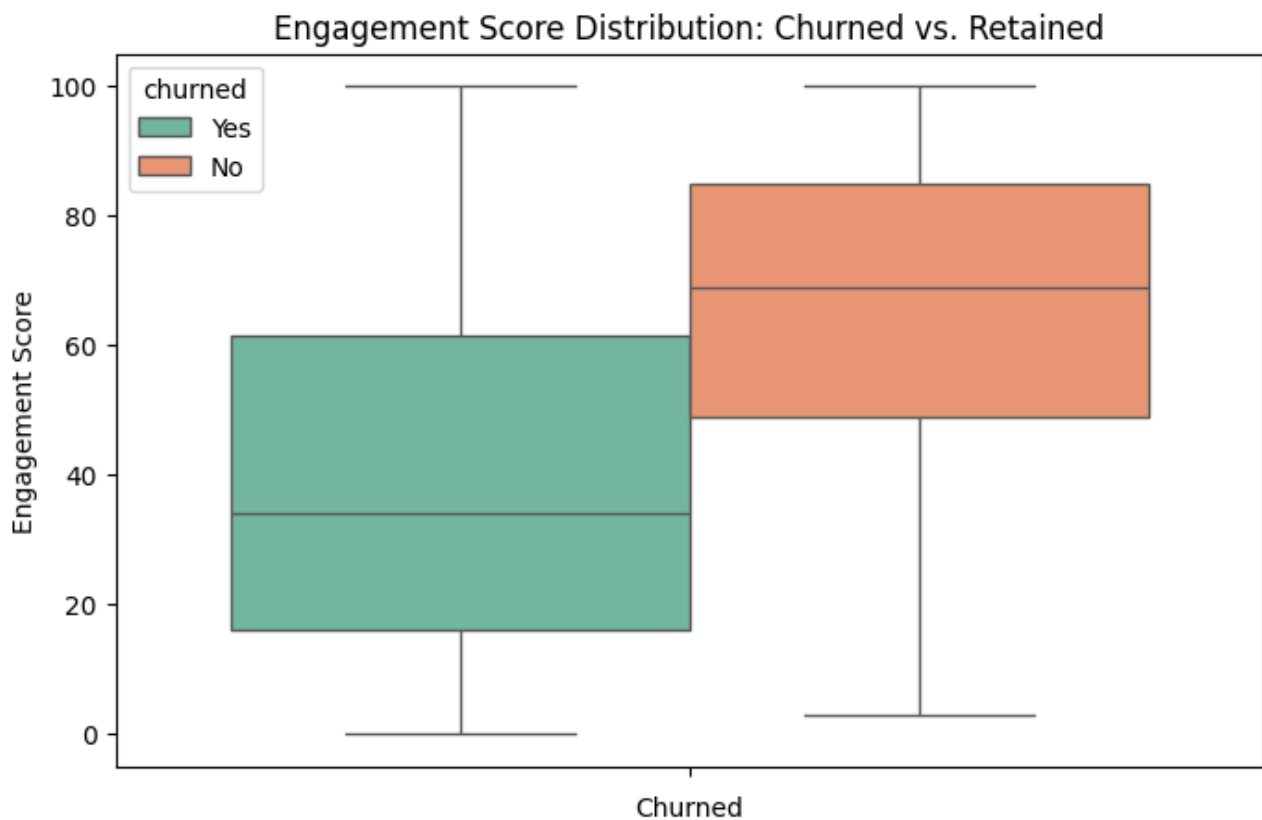
**Conclusion:** Focus on scaling high-efficiency channels (Facebook, Twitter), monitor LinkedIn and Google Ads, and align campaigns around high-performance months like March.

## 2. Customer Engagement & Churn Analysis

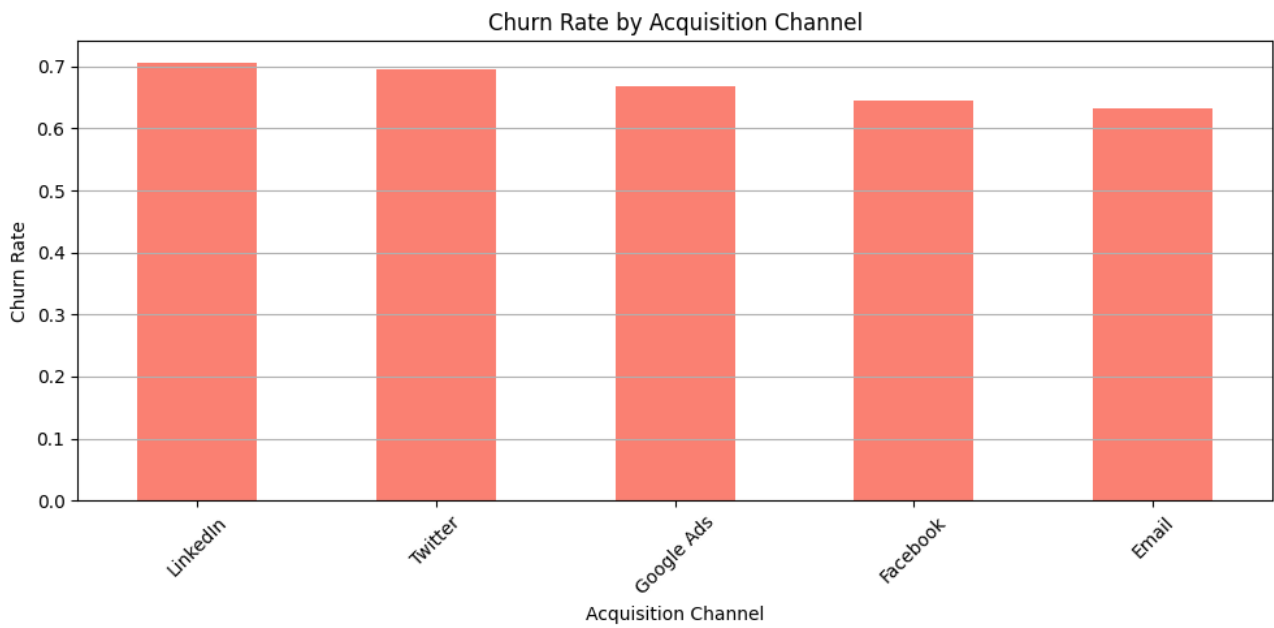
The overall churn rate was **66.3%**, indicating that two-thirds of users disengage from the platform. Analyzing **engagement scores** by churn status revealed that retained users (Churn = No) had significantly higher engagement scores than churned users.

Channel-level churn rates showed:

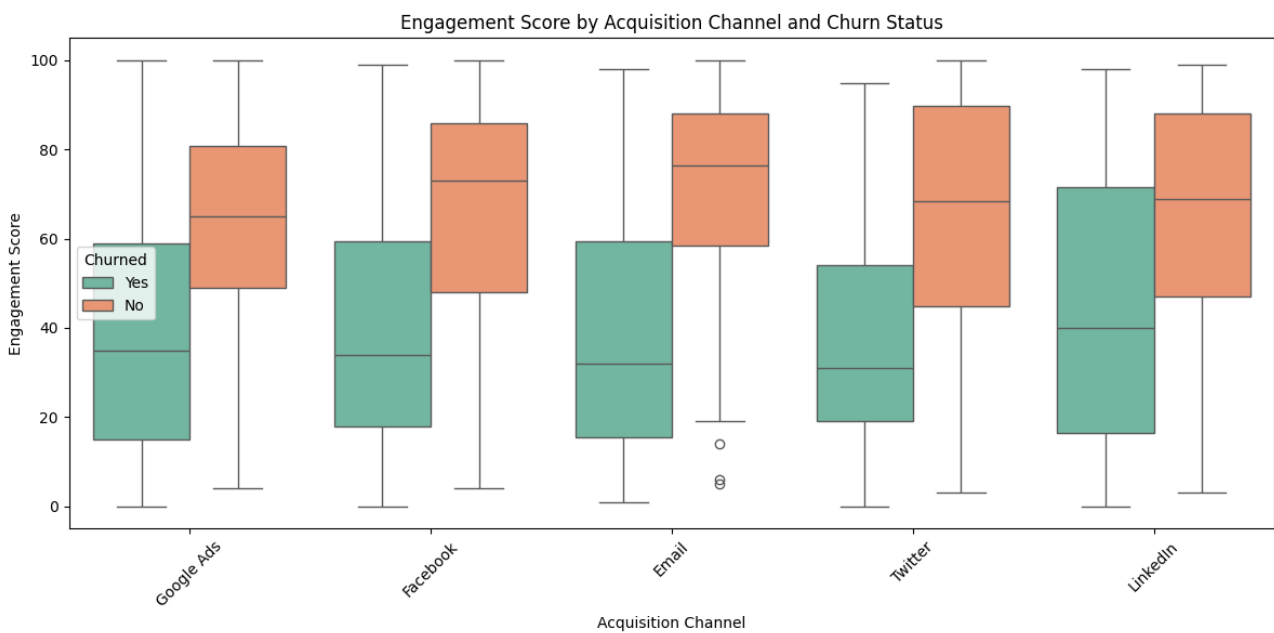
- **Email and LinkedIn** had the lowest churn rates.
- **Facebook and Twitter** had the highest churn, suggesting these users are more likely to disengage.
- When analyzing engagement scores across channels and churn status, retained users consistently had higher scores regardless of acquisition source.



> *The boxplot shows that users who did not churn have significantly higher engagement scores than those who did, confirming that engagement is closely tied to retention.*



> This bar chart illustrates that churn rate varies by channel.



> This boxplot highlights how user engagement varies across acquisition channels and churn outcomes:

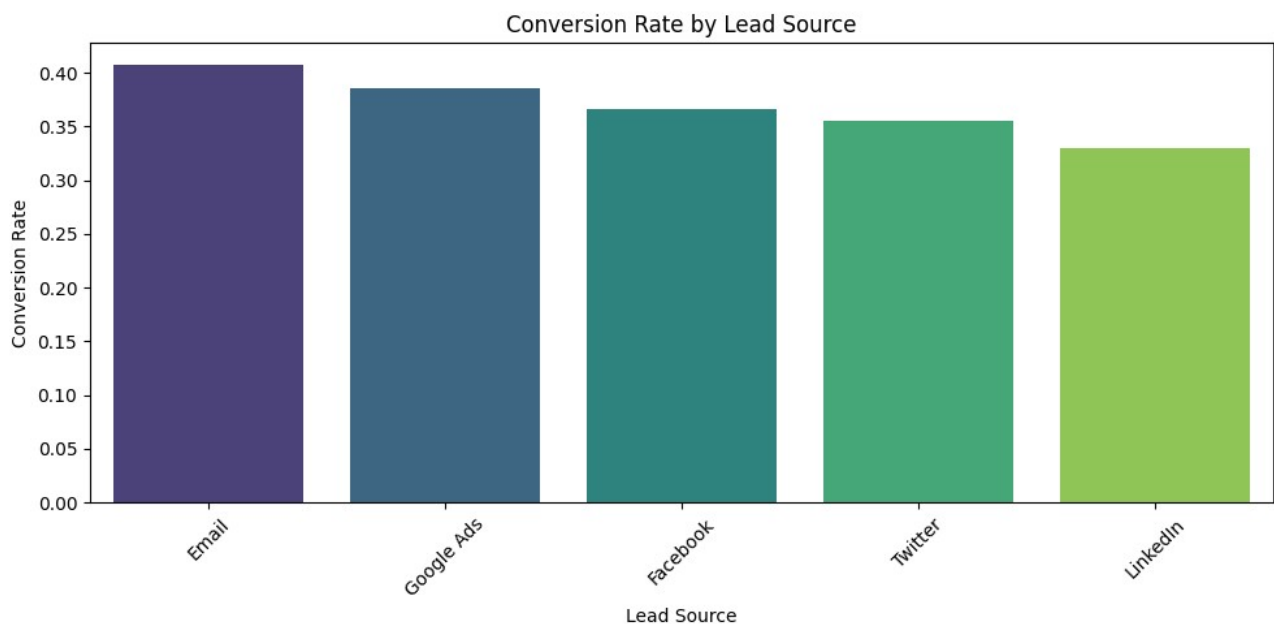
**Conclusion:** Channels like **Email** retain more engaged users, while Facebook shows a need for better onboarding or user retention efforts. Re-engagement strategies should focus on low-engagement cohorts, especially those acquired via Facebook and Twitter.

### 3. Lead Conversion Funnel Analysis

The overall conversion rate was **37.2%**, with **Email** and **Google Ads** performing best. Converted leads had significantly higher **lead scores**, confirming a positive correlation between score and conversion success ( $r \approx 0.26$ ).

Source-level analysis revealed:

- **Email** generated high-conversion leads despite average lead scores.
- **Google Ads** and **LinkedIn** produced high lead scores, but not all translated into conversions — possibly due to targeting misalignment or lack of nurturing.



> This bar plot shows that Email channel has the best conversion rate.

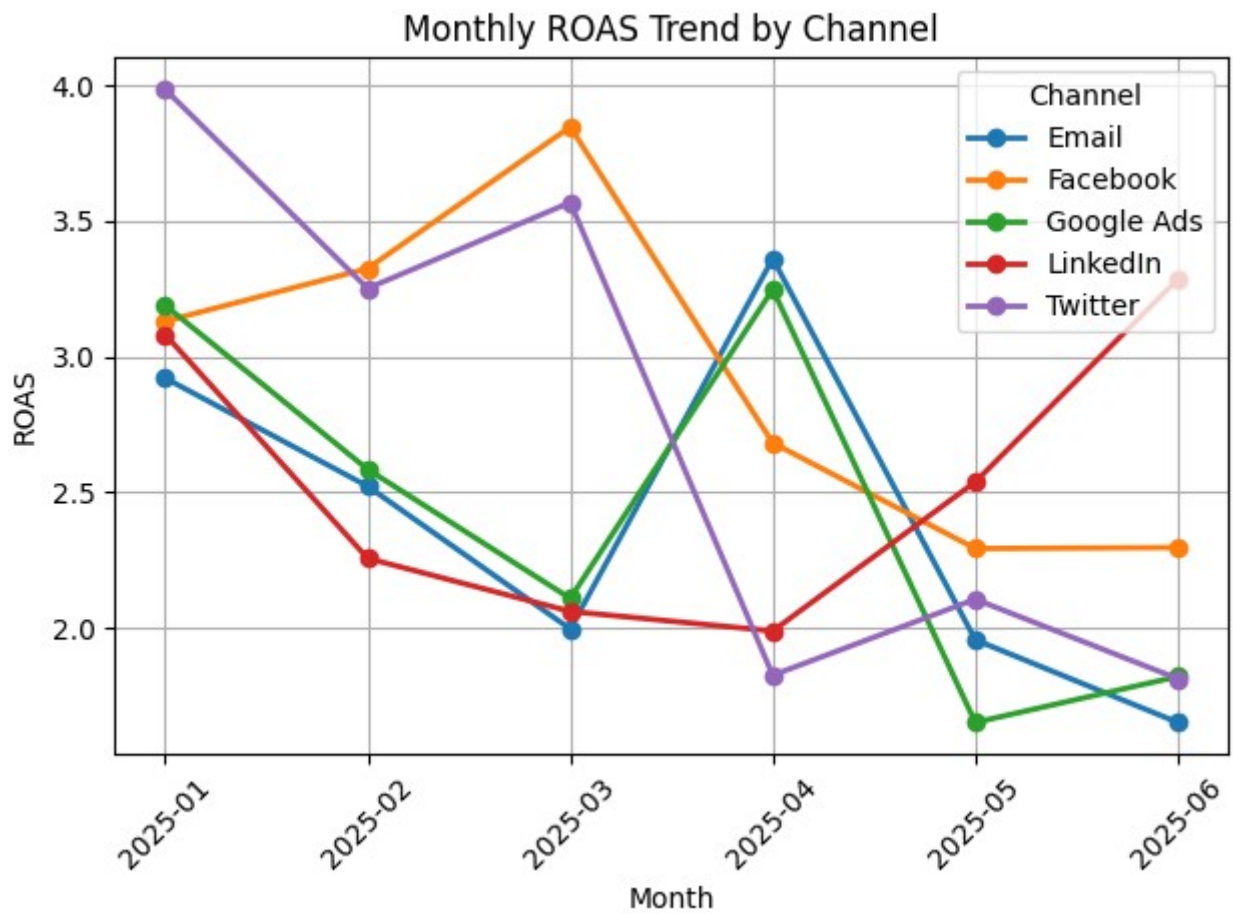
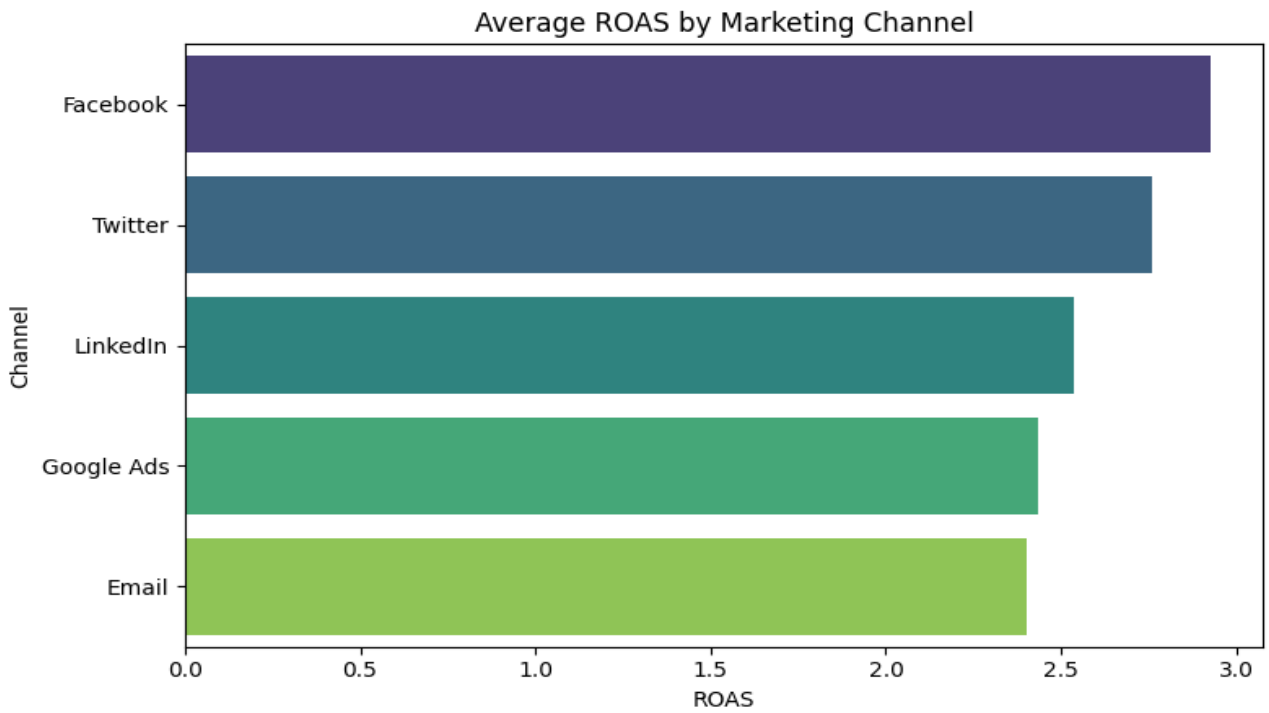
**Conclusion:** While lead score is a helpful predictor, it must be paired with proper follow-up. Focus on nurturing high-scoring leads from Google and LinkedIn, and invest further in Email-based acquisition, which consistently delivers.

#### 4. ROAS Analysis

We calculated ROAS by dividing revenue by spend for each channel over time. All five channels delivered  $ROAS > 1.0$ , indicating profitability, but there were key differences:

- **Facebook** and **Twitter** had the highest average ROAS across months.
- **LinkedIn** had the most inconsistent ROAS, with a few months dipping below 2.0 despite stable spend.
- ROAS dropped for multiple channels in **May and June**, hinting at possible market saturation or underperforming creatives.

Monthly ROAS trendlines highlighted Facebook's consistency, while LinkedIn and Email were more volatile.



> This line chart reveals how each channel's ROAS (Return on Ad Spend) fluctuated month over month from January to June 2025

**Conclusion:** ROAS performance is strong overall, but requires **monthly monitoring** to catch drops early. Inconsistent channels (like LinkedIn) should be reviewed more closely to identify causes of fluctuation.

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## Part 2: GPT-based AI Assistant

### GPT-Based Marketing Analytics Assistant

#### 1. Concept & Design:

Marketing teams often deal with large amounts of data from different channels and campaigns. To help them quickly find insights, I propose building an **AI assistant powered by GPT**, designed specifically for marketing analytics.

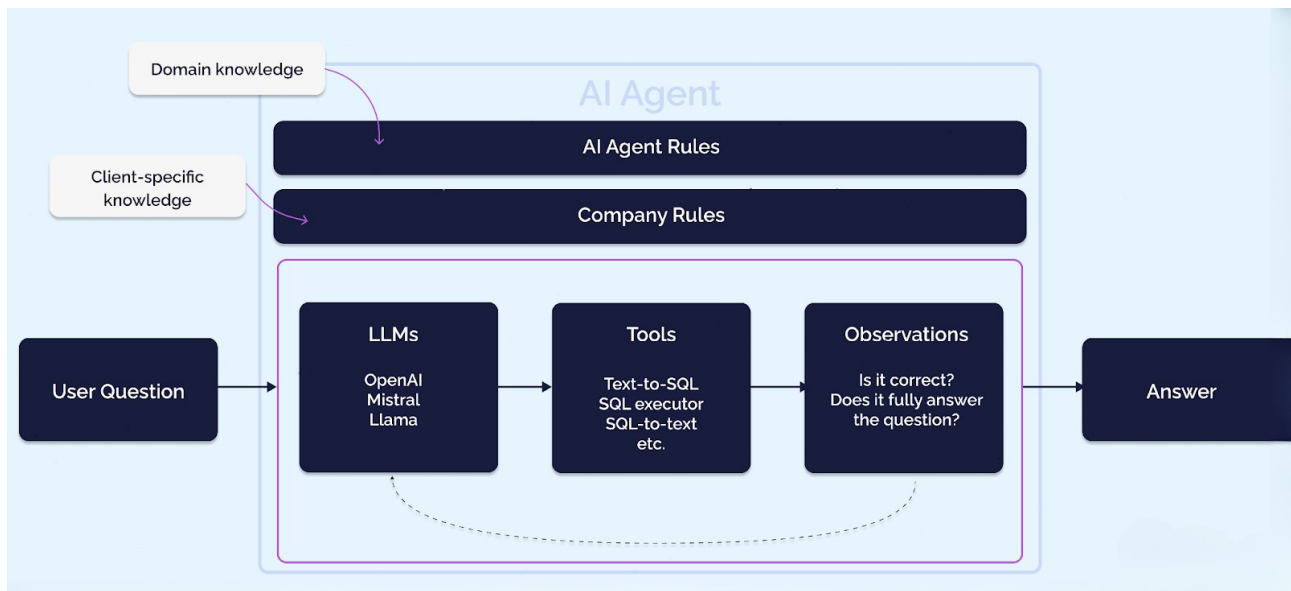
This assistant wouldn't just be a chatbot — it would act like a **data-savvy team member**. It could answer questions like:

“Which channel had the highest ROAS last month?”  
“Is churn increasing for users acquired through LinkedIn?”  
“Summarize campaign performance in one paragraph.”

To do this well, the assistant would combine:

- A **language model** (like GPT/Mistral/Llama) to understand and respond to natural language
- Access to **relevant marketing datasets** (e.g. campaign, churn, ROI data)
- **Business logic and company-specific rules**, like how churn is defined or what counts as “high-performing”

#### 2. How It Would Work?



Here's how the assistant would function, based on the AI Agent architecture I studied:

1. **User asks a question**  
e.g., "How did Email campaigns perform in Q2?"
2. **The GPT model interprets the question**  
It understands what's being asked and what data is needed
3. **A query tool (like a text-to-SQL system) runs calculations on the dataset**  
For example, filters rows by channel and quarter, and calculates ROAS
4. **The assistant checks its answer**  
Makes sure it's correct and complete. If data is missing, it can ask for clarification
5. **The final response**  
It gives a clear, human-friendly answer:  
  
"Email campaigns had an average ROAS of 2.4 in Q2, slightly below the overall average."

### 3. Key Features:

- **Ask Ad-Hoc Questions**  
"Which channel is most efficient for customer retention?"
- **Summarize Performance**  
"Write a 1-paragraph summary of June's campaign data"
- **Explain Metrics**  
"What is cost-per-conversion and how is it calculated?"
- **Detect Anomalies**  
"Alert me if churn goes above 60% on any channel"



#### 4. Tools & Tech:

- **GPT-4 (OpenAI)** as the main LLM
- **Text-to-SQL or Python backend** to fetch data
- **Pandas or SQL for logic**
- **Streamlit or Slack** for user interface
- **Company rules** (like thresholds, preferred date ranges) stored as logic

#### 5. Example Interactions:

**Q:** "What's the churn rate for LinkedIn leads?"

**A:** "The churn rate for LinkedIn-acquired users is 64%, slightly higher than average."

**Q:** "Which campaign had the best cost-per-conversion in March?"

**A:** "In March, Facebook delivered the lowest cost-per-conversion at 1.43."

**Q:** "Give me a headline for this week's dashboard."

**A:** "Campaign efficiency dipped in April, with a 12% drop in conversion rate and a higher cost-per-acquisition."

#### 6. Why This Is Valuable?

This assistant could:

- Save time for analysts and marketers
- Make data accessible to non-technical teammates
- Help with reporting, presentations, and decision-making

Instead of writing SQL queries or searching through spreadsheets, marketers could just ask questions in plain English — and get accurate, contextual answers.