📊 Google Ads Performance Analysis Report

1. Project Overview

This project presents an **end-to-end analysis of Google Ads campaign performance** with the objective of understanding how advertising spend, keyword intent, and device types impact clicks, leads, conversions, and revenue.

The analysis simulates a **real-world marketing analytics workflow**, combining data cleaning, exploratory data analysis (EDA), SQL-based querying, Python visualizations, and an interactive Power BI dashboard to derive actionable business insights.

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2. Objectives of the Analysis

The key objectives of this project are:

- To evaluate the **effectiveness of Google Ads campaigns**
- To identify **high-performing keyword intents**
- To analyze **device-wise performance** in terms of cost, conversions, and ROI
- To study **user drop-off** across the funnel (impressions → clicks → leads → conversions)
- To visualize trends and relationships between **cost, sales, and conversion metrics**

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3. Dataset Description

The dataset contains Google Ads campaign data with metrics such as:

- Impressions

- Clicks
- Cost
- Leads
- Conversions
- Sales Amount
- Device Type (Mobile, Desktop, Tablet)
- Keyword Intent (Informational, Commercial, Transactional)
- Date

Two versions of the dataset were maintained:

- **Raw data** for original reference
- **Cleaned data** after preprocessing and feature engineering

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4. Data Cleaning & Preprocessing (Python)

Data cleaning and preprocessing were performed using **Pandas and NumPy**, which included:

- Handling missing and inconsistent values
- Removing duplicates
- Converting data types for numerical analysis
- Creating derived metrics such as:
    - Conversion Rate
    - Cost per Click (CPC)
    - Cost per Conversion

- Standardizing keyword intent categories

The cleaned dataset was then used for visualization and SQL analysis.

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5. Exploratory Data Analysis & Visualizations

Multiple visualizations were created using **Matplotlib and Seaborn** to uncover patterns and trends:

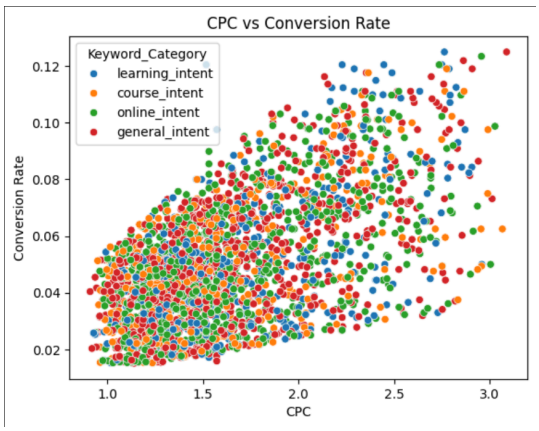
Key Analyses Performed

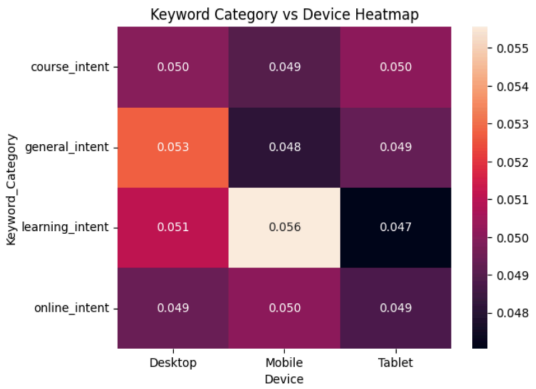
1. **Marketing Funnel Drop-off**
    - Visualized the transition from impressions → clicks → leads → conversions
    - Helped identify stages with maximum user drop-off
2. **Device-wise Performance Analysis**
    - Compared cost, clicks, conversions, and ROI across Mobile, Desktop, and Tablet
    - Identified which devices delivered better conversion efficiency
3. **Keyword Intent Effectiveness**
    - Analyzed how different keyword intents perform in terms of conversions and revenue
    - Highlighted high-intent keywords driving better outcomes
4. **Cost vs Sales / Revenue Trends**
    - Scatter plots and trend analysis to understand how ad spend impacts revenue
    - Identified diminishing returns at higher spend levels
5. **Distribution Analysis**
    - Box plots and violin plots to study spread and variability in cost, conversions, and revenue

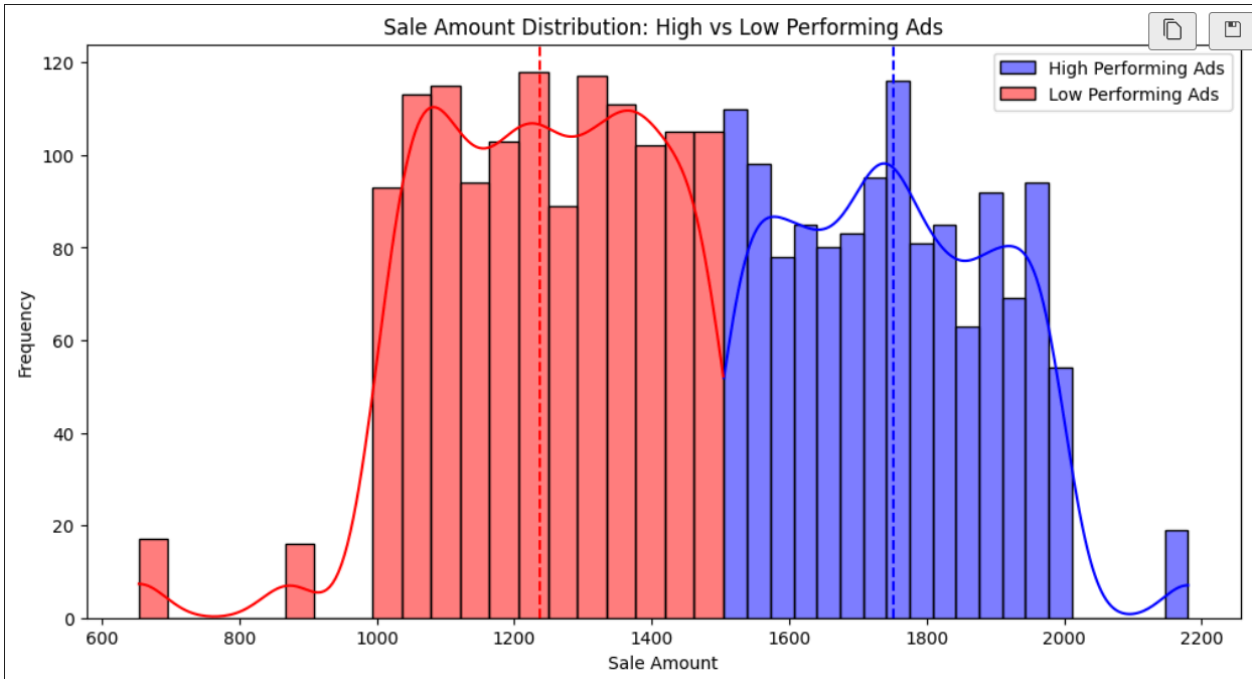
6. **Correlation Analysis**

    - Heatmaps to identify relationships between impressions, clicks, cost, leads, conversions, conversion rate, and sales amount

These analyses help translate raw campaign data into **actionable insights**, similar to how a real-world data analyst evaluates marketing performance.







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6. SQL Analysis

The cleaned dataset was loaded into **PostgreSQL**, and multiple SQL queries were written to:

- Analyze campaign-level performance
- Compare device-wise metrics
- Aggregate keyword intent performance
- Identify top-performing and underperforming segments
- Perform grouping, filtering, and aggregation using SQL best practices

This step demonstrates the ability to work with **structured databases** alongside Python analytics.

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7. Power BI Dashboard

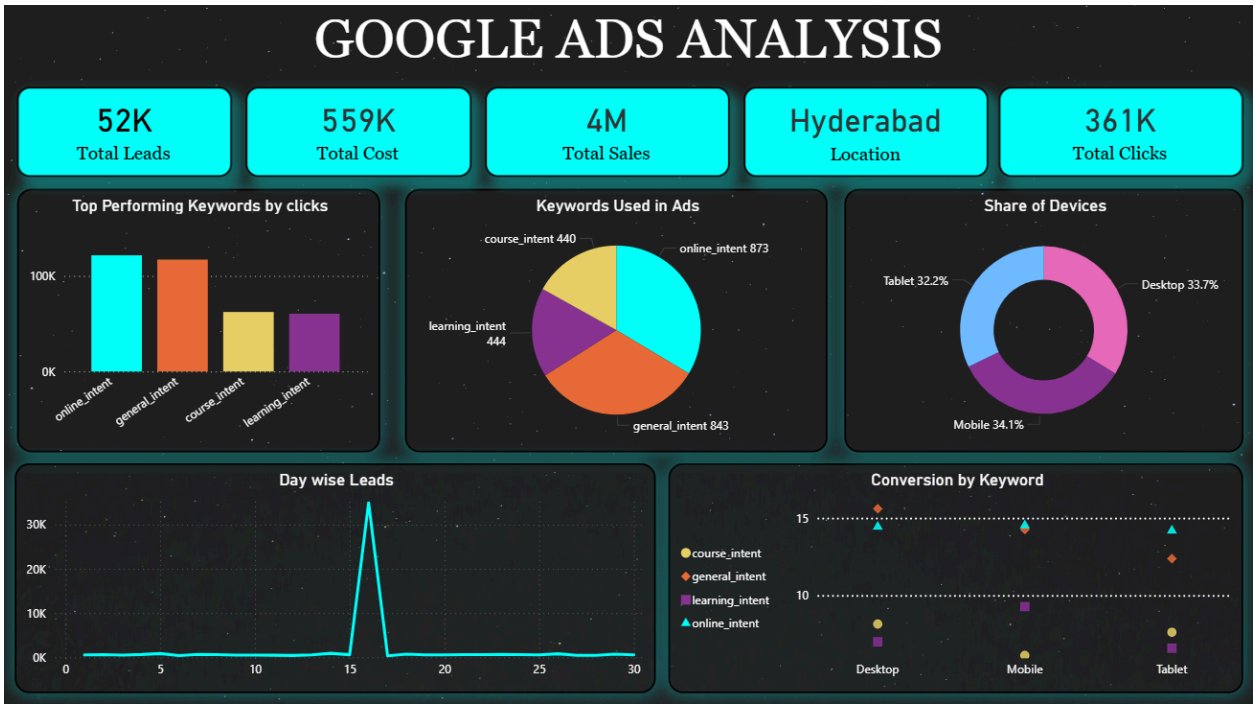
An interactive **Power BI dashboard** was developed to present insights in a business-friendly format.

Dashboard Highlights

- KPI cards for:
    - Total Leads
    - Total Cost
    - Total Sales
    - Total Clicks
    - Top Location
- Keyword performance by clicks
- Keyword intent distribution
- Device-wise traffic share

- Day-wise lead trends
- Conversion comparison across devices and keyword intents

The dashboard enables stakeholders to quickly monitor performance and make data-driven decisions.



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8. Tools & Technologies Used

- **Python** (Pandas, NumPy, Matplotlib, Seaborn)
- **PostgreSQL**
- **SQL**
- **Power BI**
- **Jupyter Notebook**
- **GitHub** for version control and documentation

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9. Key Insights

- High-intent keywords contribute significantly to conversions and revenue
- Device performance varies, with noticeable differences in conversion efficiency
- Certain campaign days show spikes in leads, indicating successful ad pushes
- Increased spend does not always guarantee proportional revenue growth
- Funnel analysis highlights key drop-off stages requiring optimization

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10. Conclusion

This project presents a comprehensive end-to-end marketing analytics solution that transforms raw Google Ads campaign data into meaningful, actionable insights. By integrating data cleaning, preprocessing, SQL-based analysis, Python-driven exploratory data analysis, and interactive Power BI dashboards, the project mirrors how marketing and data analytics teams operate in real-world business environments.

Through funnel analysis, the project highlights critical drop-off points between impressions, clicks, leads, and conversions, enabling a clearer understanding of campaign efficiency. Device-wise and keyword intent analyses provide deeper insights into user behavior, revealing how different platforms and intent categories contribute to conversions and revenue. Additionally, trend analysis, distribution analysis, and correlation studies uncover relationships between advertising spend, user engagement, and sales performance, supporting more informed budget allocation and optimization strategies.

The Power BI dashboard consolidates these insights into an intuitive, decision-ready interface, allowing stakeholders to quickly monitor KPIs, identify high-performing segments, and detect underperforming areas. This visual storytelling approach ensures that technical findings are easily interpretable and actionable for both technical and non-technical audiences.

Overall, this project demonstrates the practical application of data analytics techniques to solve real marketing problems. It showcases the ability to combine technical skills with business understanding to drive campaign optimization, improve return on investment, and support strategic, data-driven decision-making—reflecting the responsibilities and expectations of a real-world data analyst.