



Website Performance Analysis

(Python Project Report)

Project Objective

The objective of this project is to analyze website performance data to understand user behavior, traffic sources, engagement levels, and time-based trends. By leveraging Python-based data analysis and visualization techniques, this project aims to identify high-performing marketing channels, uncover engagement patterns, and provide actionable insights to improve website traffic and user engagement.

Problem Statement

Websites receive traffic from multiple marketing channels, but not all channels contribute equally to quality engagement and user retention.

The key challenges addressed in this project are:

- Understanding trends in sessions and users over time
- Identifying top-performing and underperforming traffic channels
- Measuring engagement rate and average engagement time
- Analyzing hourly traffic behavior
- Exploring the relationship between traffic volume and engagement
- Addressing these challenges helps businesses optimize marketing strategies and improve overall website performance.

Data Visualization & Insights

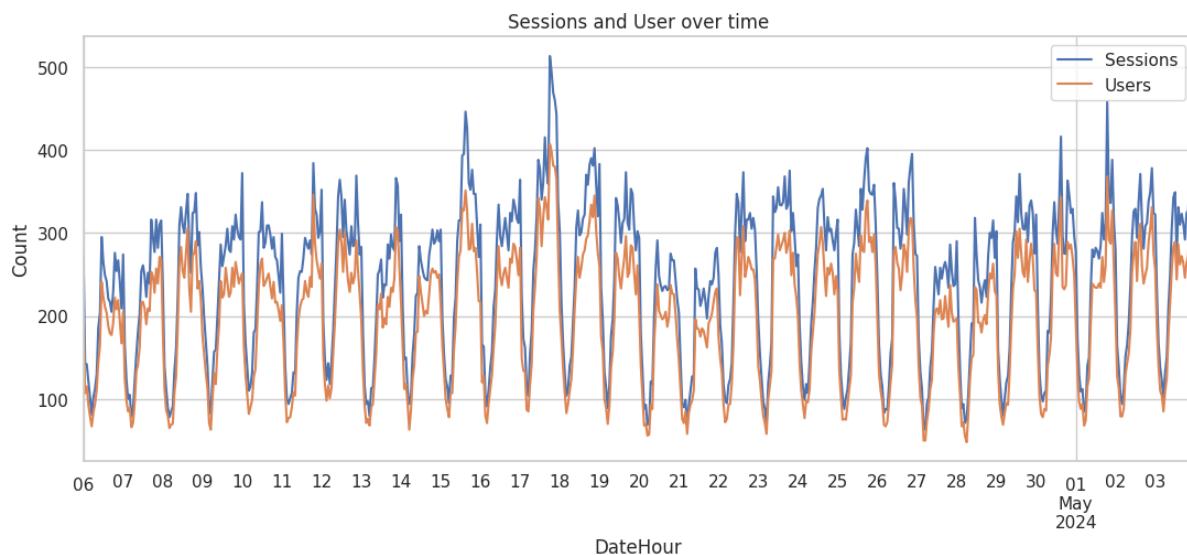
1. Website Sessions & Users Trend Over Time

Visualization Used: Line Charts

Insight:

- Sessions and users show consistent growth with periodic fluctuations.
- Traffic peaks indicate successful campaigns or seasonal effects.
- Declines may suggest reduced marketing activity or content fatigue.

Insight: Monitoring these trends helps in planning campaigns during high-impact periods.



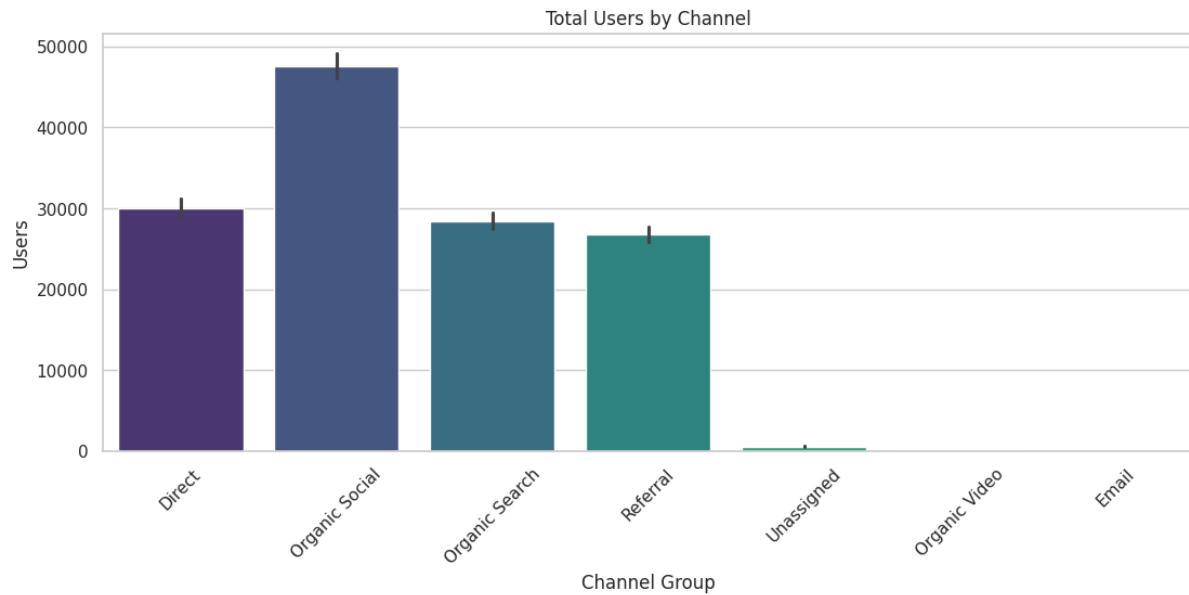
2. Marketing Channel Contribution

Visualization Used: Bar Chart

Insight:

One channel (e.g., Organic Search or Direct) contributes the highest number of users. Other channels such as Social or Referral contribute comparatively less traffic.

Insight: High-performing channels should be scaled, while underperforming channels need strategy refinement.



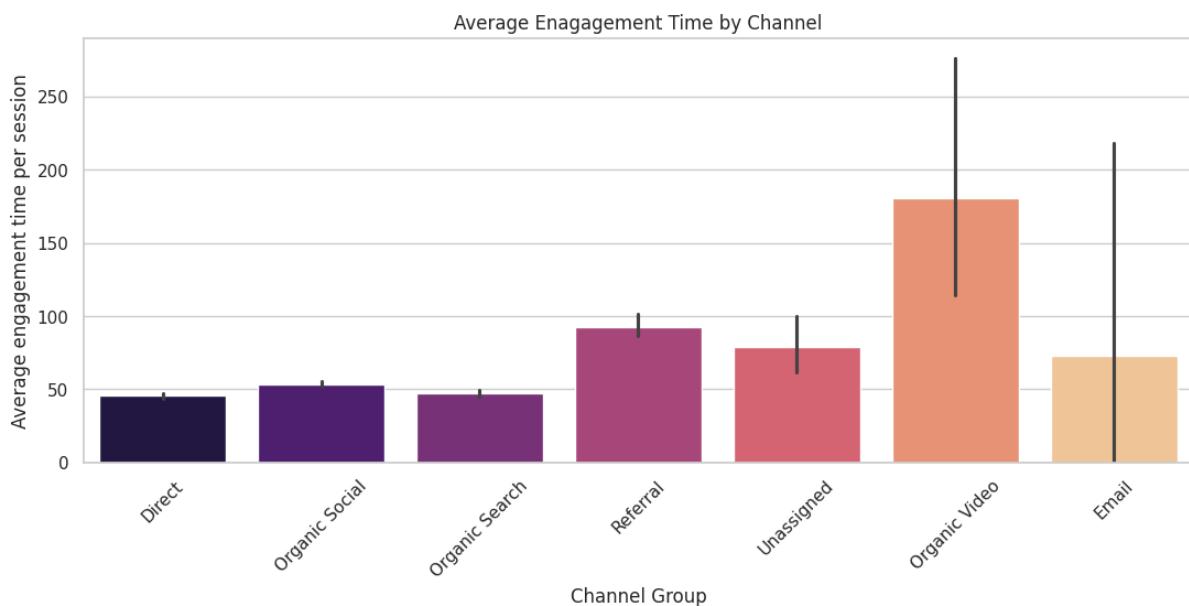
3. Average Engagement Time by Channel

Visualization Used: Bar Chart

Insight:

- Certain channels have lower traffic but higher engagement time, indicating high-quality users.
- Channels with high traffic but low engagement may attract less relevant users.

Insight: Engagement time is a stronger quality metric than traffic alone.



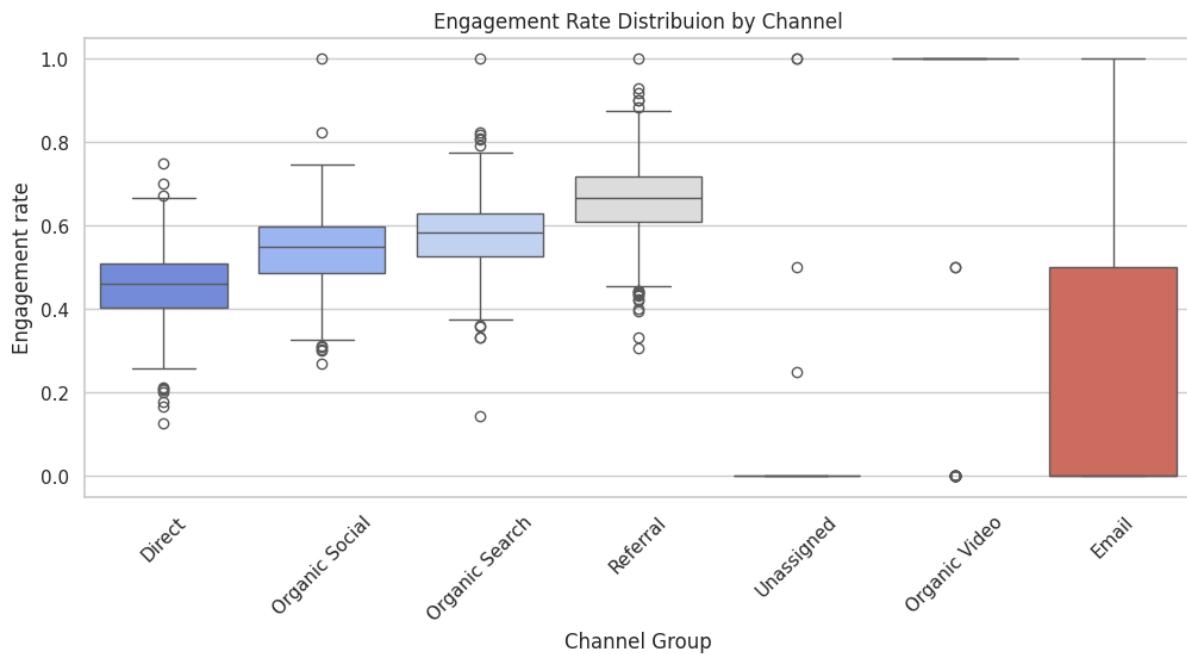
4. Engagement Rate Across Channels

Visualization Used: Bar / Column Chart

Insight:

- Engagement rates vary significantly across channels.
- Some channels drive more engaged sessions than non-engaged sessions.

Insight: Content alignment and audience targeting influence engagement success.



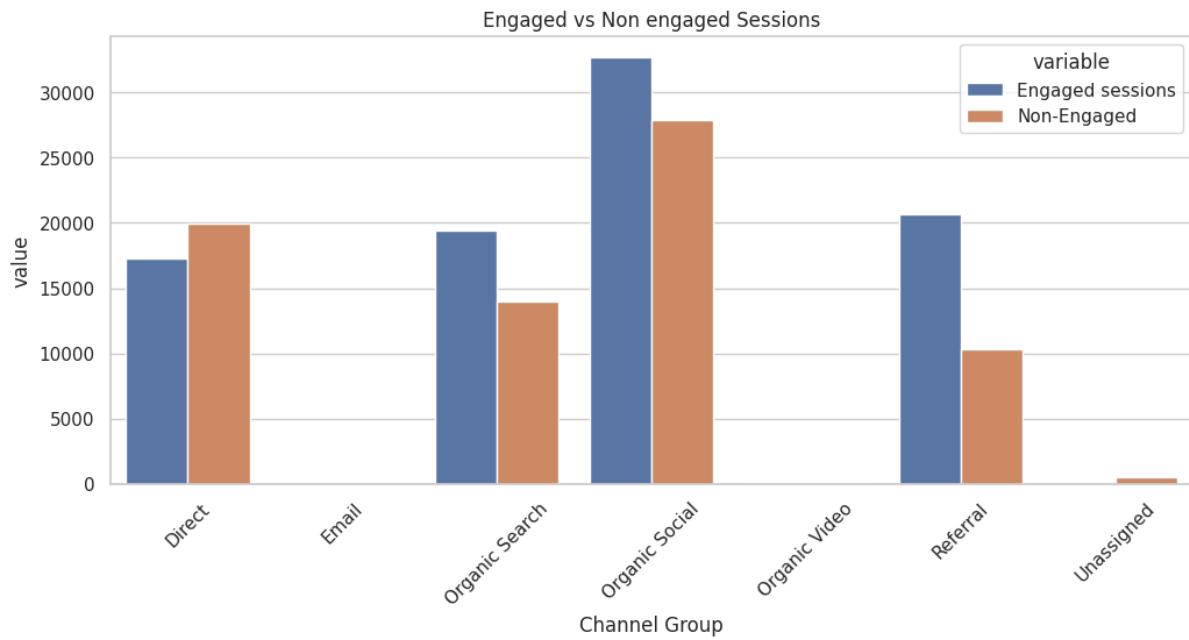
5. Engaged vs Non-Engaged Sessions

Visualization Used: Stacked Bar Chart

Insight:

- Top-performing channels have a higher proportion of engaged sessions.
- Underperforming channels show a high bounce or low engagement ratio.

Insight: Improving landing pages and call-to-action strategies can boost engagement.

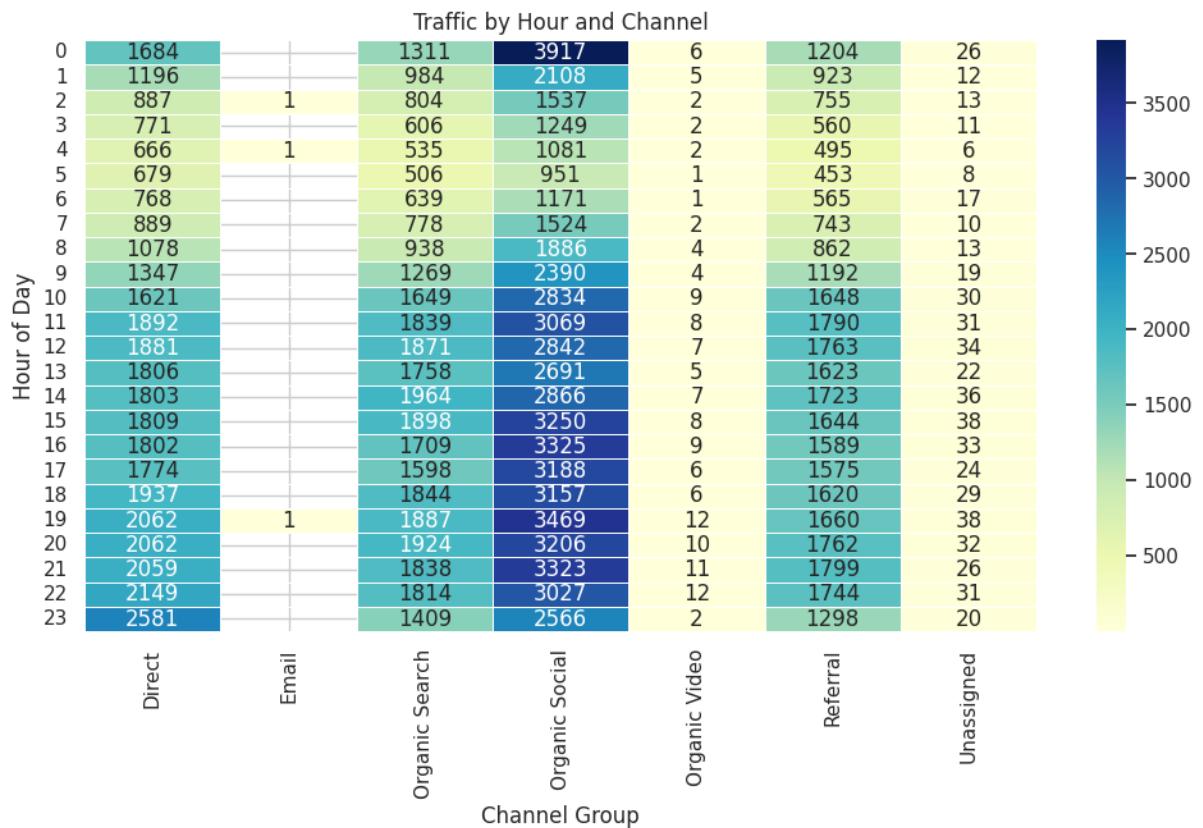


6. Hourly Traffic Analysis

Visualization Used: Line / Heatmap Insight:

- Traffic peaks occur during specific hours of the day.
- Different channels peak at different times (e.g., Social in evenings, Organic during work hours).

Insight: Publishing content and running ads during peak hours can maximize reach.



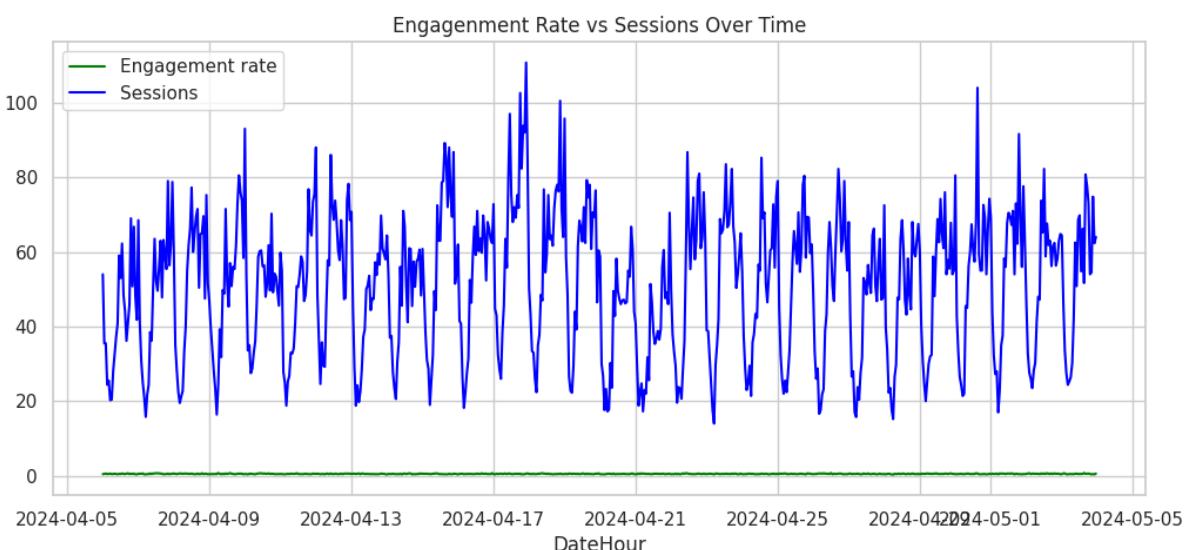
7. Traffic vs Engagement Correlation

Visualization Used: Scatter Plot

Insight:

- High traffic does not always mean high engagement.
- Moderate correlation observed between sessions and engagement rate.

Insight: Quality traffic matters more than quantity.



Conclusion

This Website Performance Analysis project demonstrates how Python can be effectively used to analyze and visualize web analytics data. The analysis reveals that:

- Not all traffic channels contribute equally to engagement
- High user volume does not guarantee better performance
- Engagement metrics provide deeper insights into user behavior
- Time-based analysis is critical for campaign optimization Overall, the project helps stakeholders make data-driven decisions to enhance website performance and user experience.

Recommendations

Based on the analysis, the following recommendations are suggested:

- Invest more in high-engagement channels rather than focusing only on traffic volume.
- Optimize underperforming channels by improving content relevance and landing page design.
- Schedule campaigns during peak traffic hours to maximize visibility.
- Track engagement metrics regularly, not just sessions or users.
- Use A/B testing to improve engagement rates across channels.
- Combine traffic analysis with conversion data for deeper business insights.