User Traffic and Application Analysis

Data insights for optimization

Date: 20/12/25

Introduction

- Objective: Analyze user behavior patterns and application usage to extract actionable insights for business decisions.
- Tasks Covered:

  Analyzed traffic data for clustering user behaviors.

  Examined the contribution of different applications to overall traffic and engagement.

Data Overview

- Dataset: Contains user traffic data including session duration, upload/download traffic, and application categories.
- Key Metrics:

  Total session duration (ms)

  Total upload/download traffic (Bytes)

  Application-specific traffic (Social Media, Google, etc.)

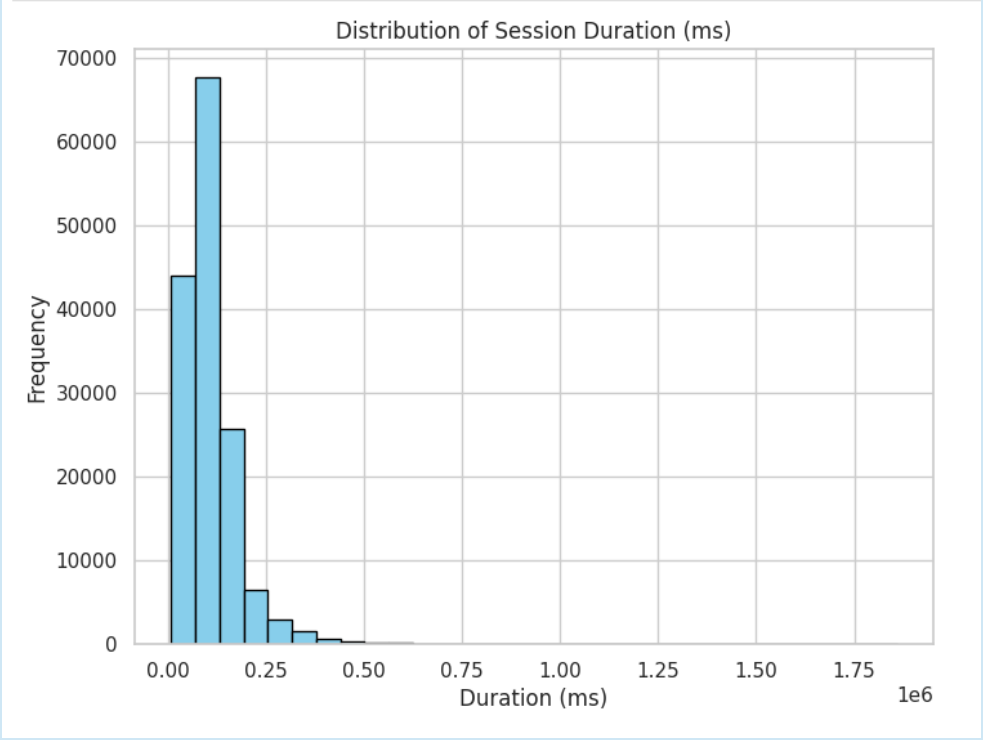
Univariate Analysis

- Objective: Examine individual variables to understand data distribution.
- Key Variables:

  Session Duration: Duration of user sessions (ms).

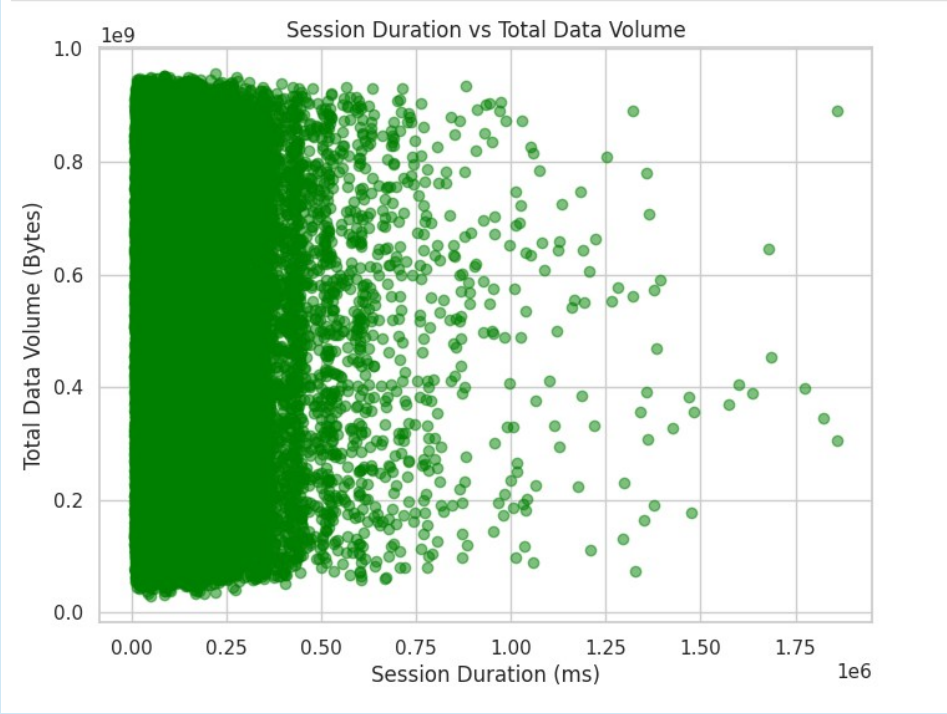
  Total Traffic: Upload and download traffic for each user.

Distribution of Session Duration (Dur. ms).



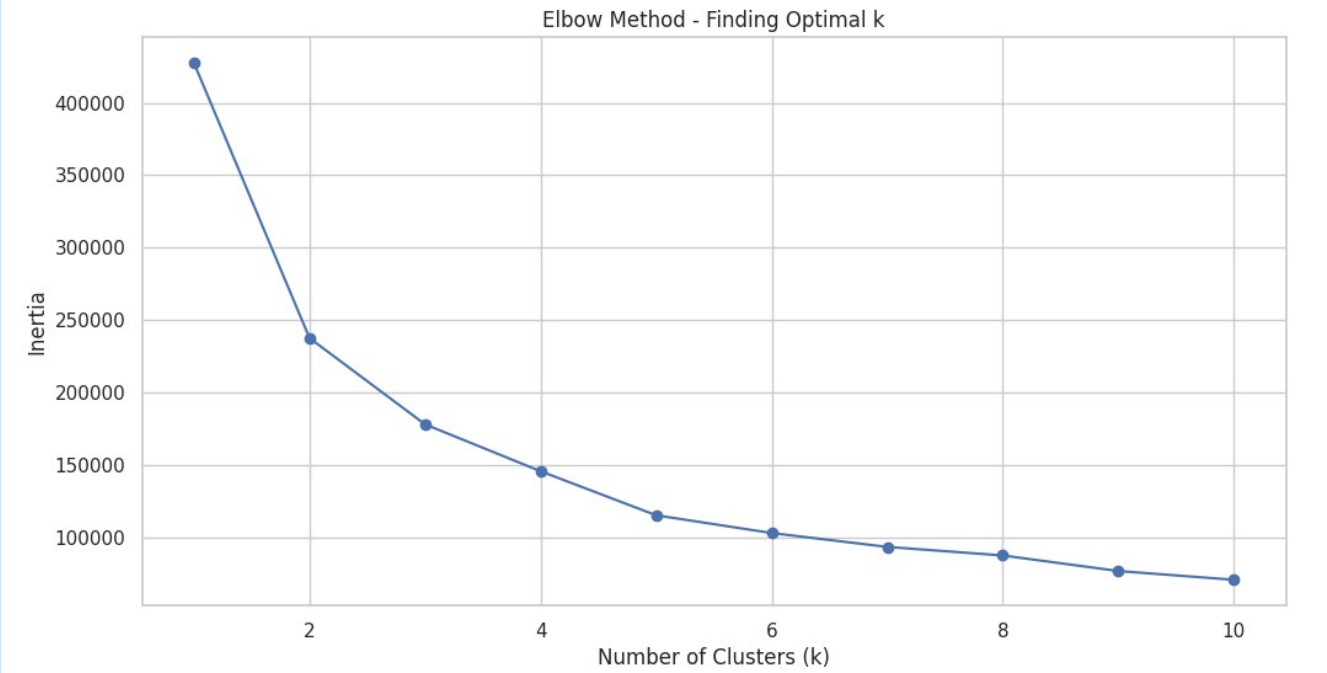
Bivariate Analysis

- Objective: Analyze relationships between variables.
- Key Observation: Explore correlation between session duration and total data usage.



Clustering Analysis

- Objective: Segment users based on their traffic patterns using K-Means clustering.
- Key Insight: Identify distinct user behavior clusters (e.g., heavy data users, light data users).



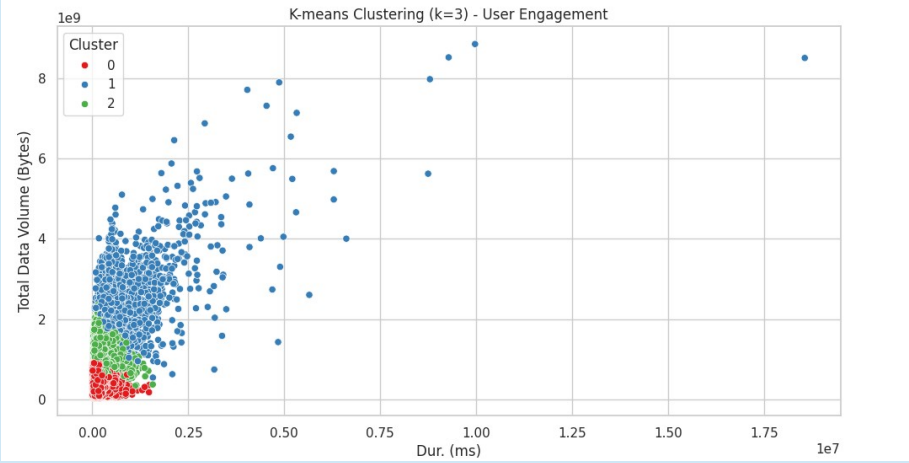
Cluster Summary

- Objective: Review the traffic patterns within each user segment (cluster).
- Cluster Insights:

  Cluster 0: Light data users, low session duration.

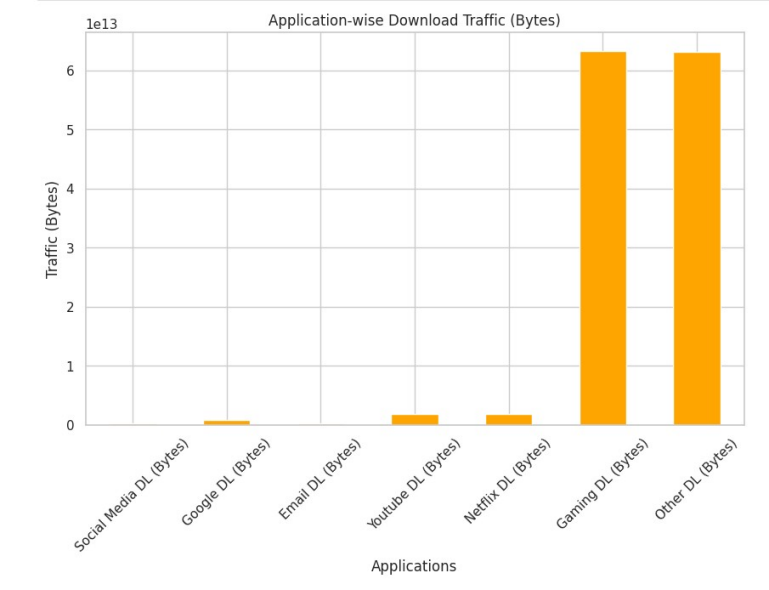
  Cluster 1: Heavy data users, high session duration.

  Cluster 2: Moderate data users, moderate session duration.



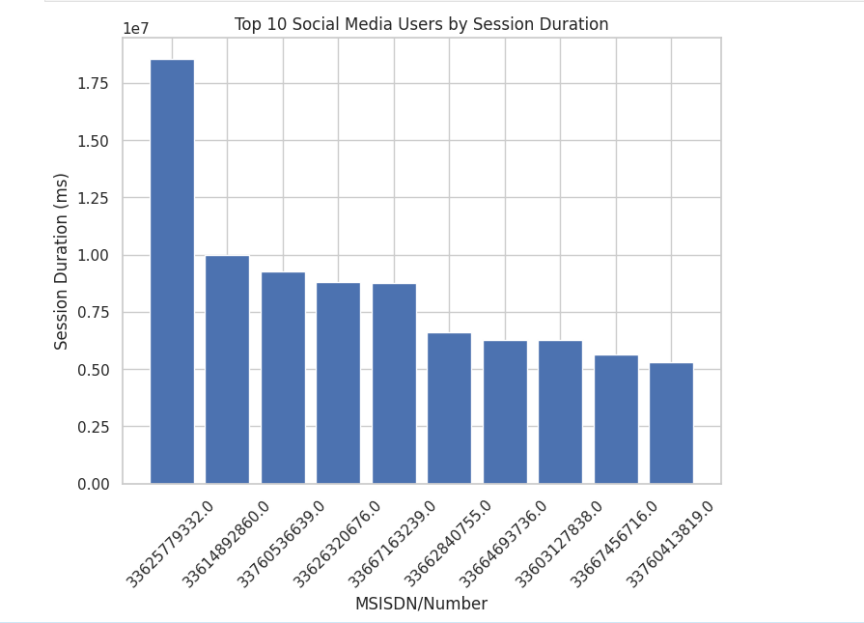
Application Contribution to Traffic

- Objective: Examine how each application contributes to total traffic.
- Insight: YouTube, Netflix, and Gaming account for the largest portions of the total traffic.



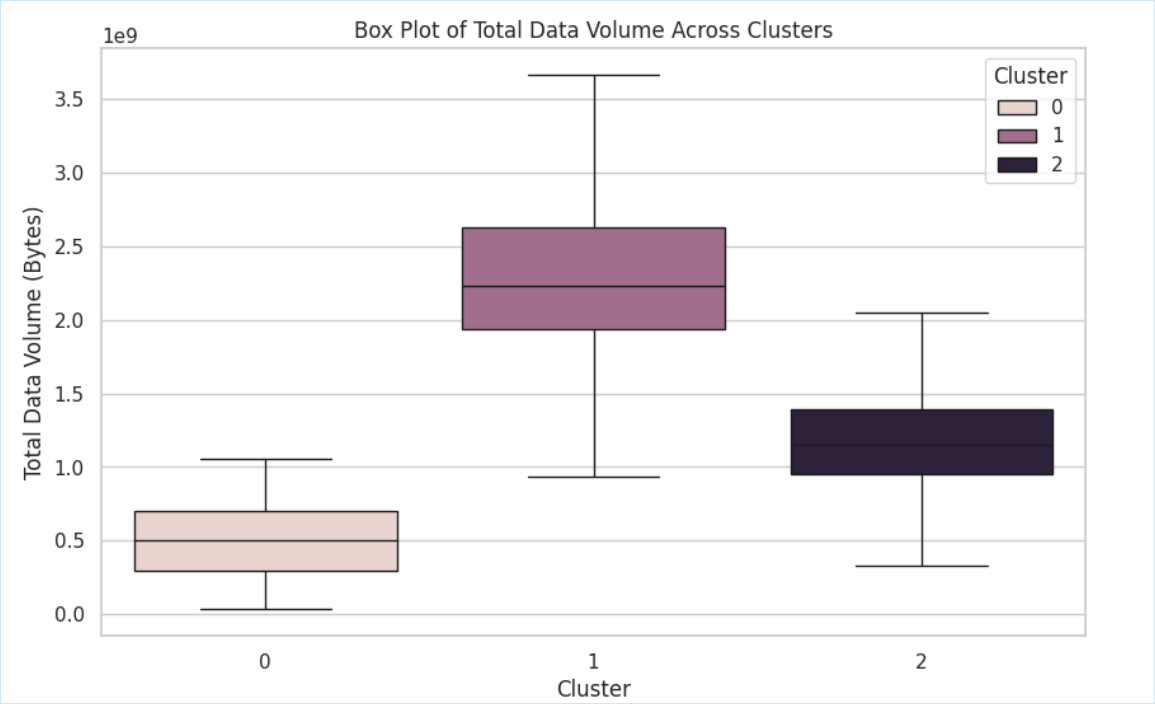
Top Users By Application

- Objective: Identify the top 10 users for each application based on session duration.
- Insight: Some users contribute significantly to total traffic.



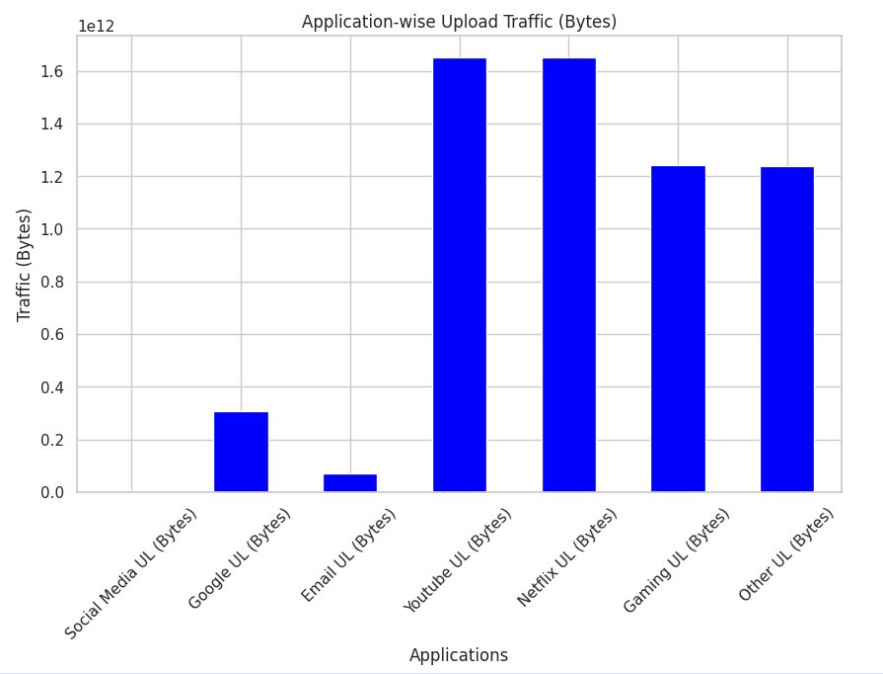
Cluster Traffic Comparison

- Objective: Compare traffic behavior between clusters.



Application Contribution by Upload Traffic

- Objective: Examine the upload traffic for each application to understand the balance between data consumption and upload.



Actionable Insights

- Key Findings:

  Heavy traffic from Gaming and Streaming: These applications dominate both upload and download traffic.

  Cluster 1: Represents the most active users, who contribute significantly to network traffic.

  Potential for optimization: Targeting heavy-usage applications for optimization could improve overall network performance.

Recommendations for Business

- Optimization: Focus on the most heavily used applications (Gaming, YouTube, Netflix) to ensure quality of service and reduce congestion.
- Personalized Marketing: Tailor services or offers for different user segments based on their traffic patterns.
- Network Expansion: Focus on areas with high traffic from heavy users for infrastructure upgrades.

Conclusion

- The analysis reveals significant user behavior patterns that can guide network optimization, marketing strategies, and infrastructure planning.
- Further exploration into temporal data patterns or user demographics may provide additional insights.