User Analytics in the Telecommunication Industry – A Case Study on TellCo

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Introduction

ABOUT TELLCO
TELLCO IS A MOBILE SERVICE PROVIDER OPERATING IN THE REPUBLIC OF PEFKAKIA. THE COMPANY PROVIDES DATA, VOICE, AND OTHER TELECOM SERVICES TO THOUSANDS OF MOBILE USERS.

- OBJECTIVE: HELP INVESTOR EVALUATE BUSINESS THROUGH DATA

- PHASES: OVERVIEW, ENGAGEMENT, EXPERIENCE, SATISFACTION

Project Objectives

- ANALYZE MOBILE USER BEHAVIOR & DEVICE USAGE
- ASSESS NETWORK EXPERIENCE
- SCORE SATISFACTION
- GUIDE INVESTMENT DECISION

Dataset Summary

- Source: xDR data (1 month)

- Total records & features

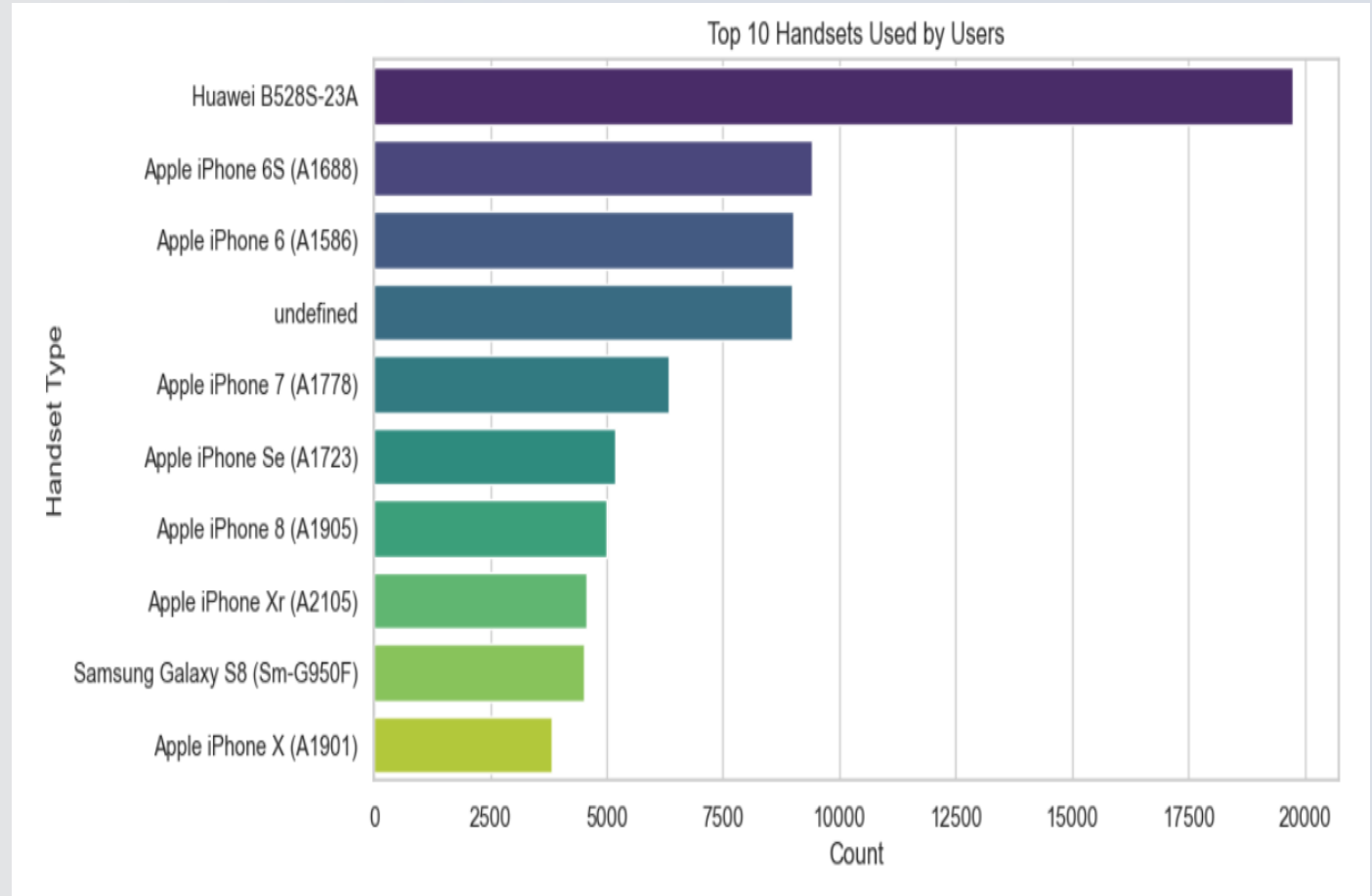- Types of data: session, throughput, device, app usage

Data Cleaning & Preparation

- HANDLED MISSING VALUES (MEAN)
  - REMOVED DUPLICATES
  - AGGREGATED PER USER
- NORMALIZED FOR CLUSTERING

Top Handsets and Manufacturers

- Graph: Top 10 Handsets (bar chart)

- Insight: Most users prefer few device models

Top 10 Handsets Used by Users

Top Manufacturers + Devices

- Graph: Top 3 brands and top 5 handsets each (bar + table)

- Marketing tip: Partner with high-use brands

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Top 3 Handset Manufacturers:
 Handset Manufacturer
Apple        59565
Samsung      40839
Huawei       34423
Name: count, dtype: int64
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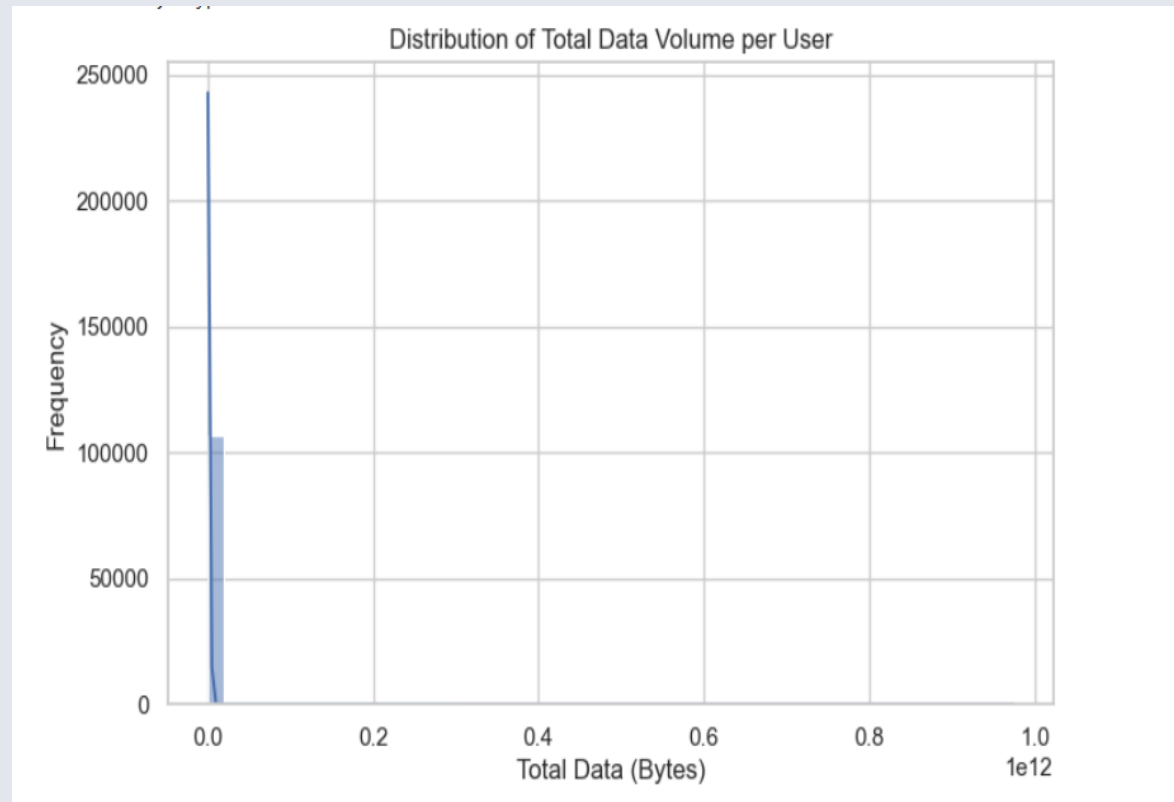
User Overview Metrics

- Aggregated: sessions, duration, DL/UL, app traffic
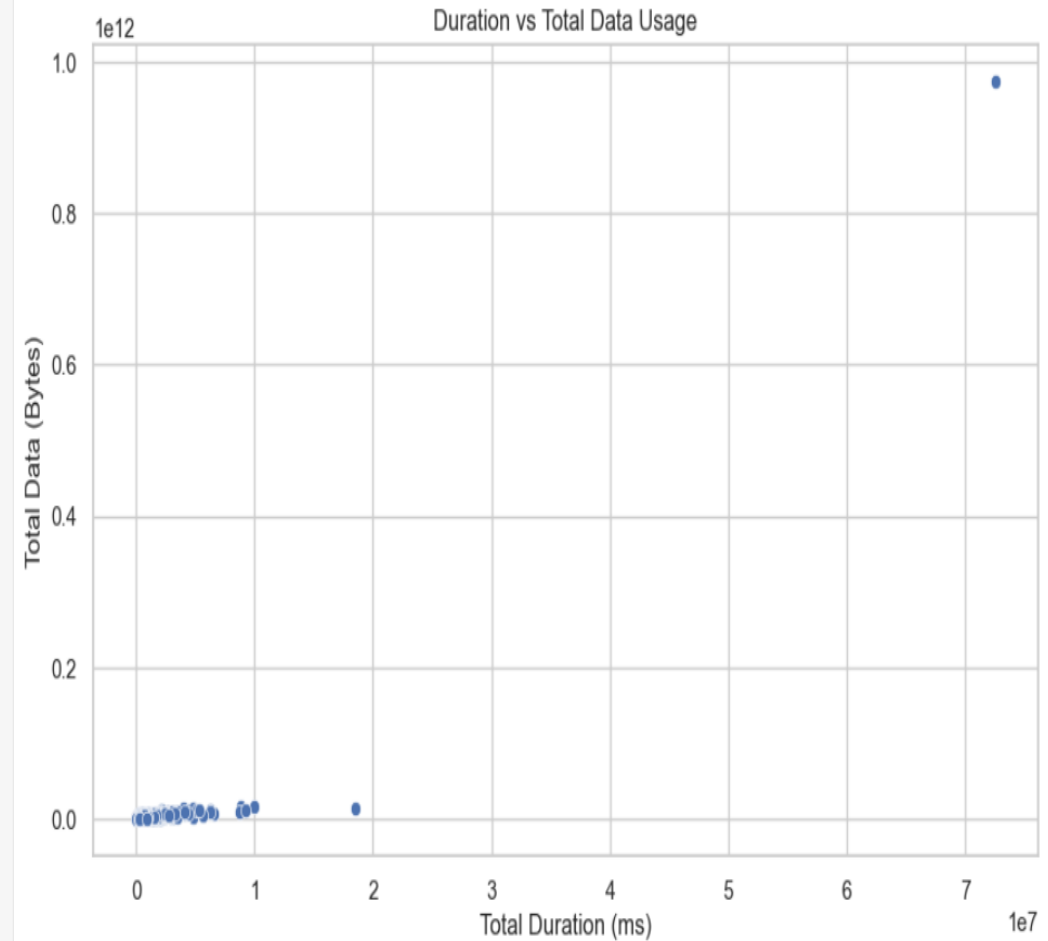
- Table: Sample user stats

Univariate Analysis

Plot: Histogram + KDE
of Total Data Volume

Finding: Heavy data use
= small % users

Distribution of Total Data Volume per User

Bivariate Analysis

- Scatter: Session Duration vs Total Data
- Finding: Positive correlation

Duration vs Total Data Usage

Correlation & PCA

- Heatmap: App usage correlation
- PCA plot: Cluster of similar usage users
- Insight: YouTube + Netflix dominate

Correlation Matrix of Application Data Usage
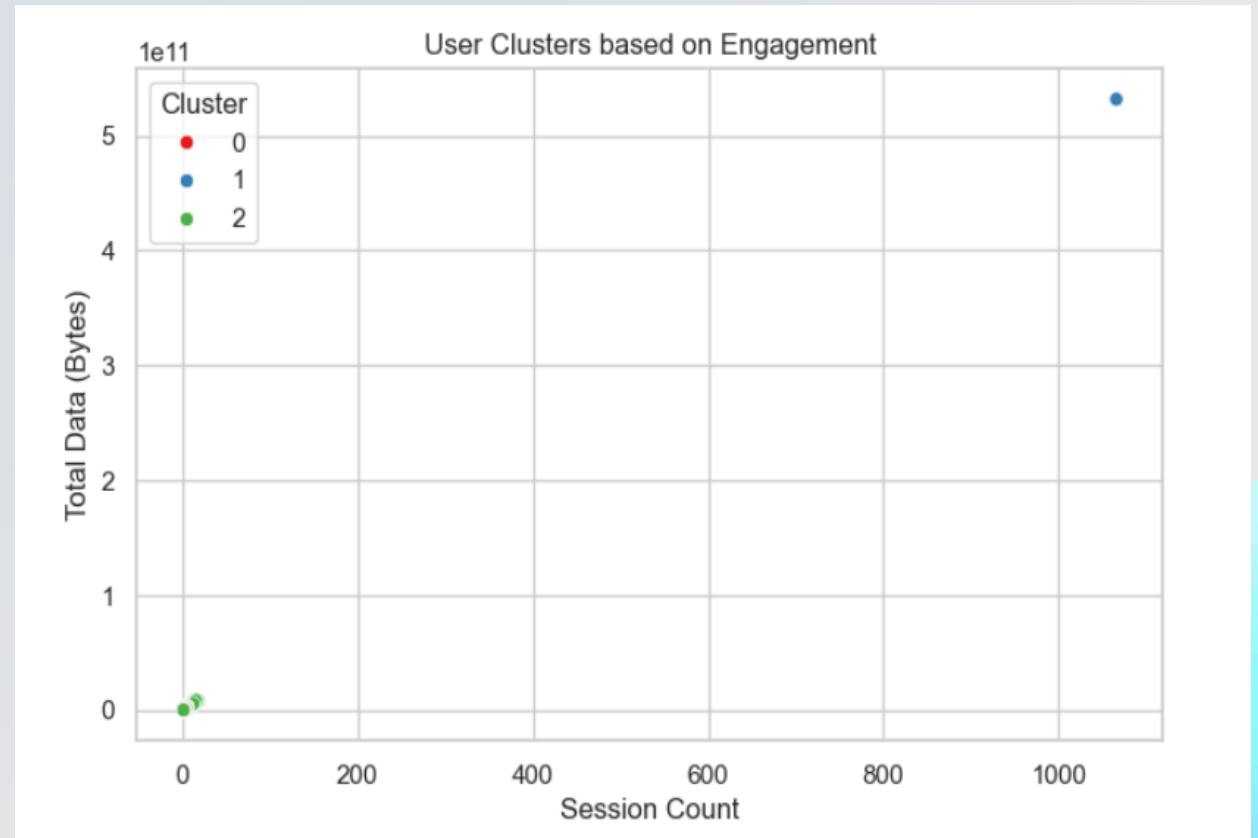

PCA - User App Usage Data
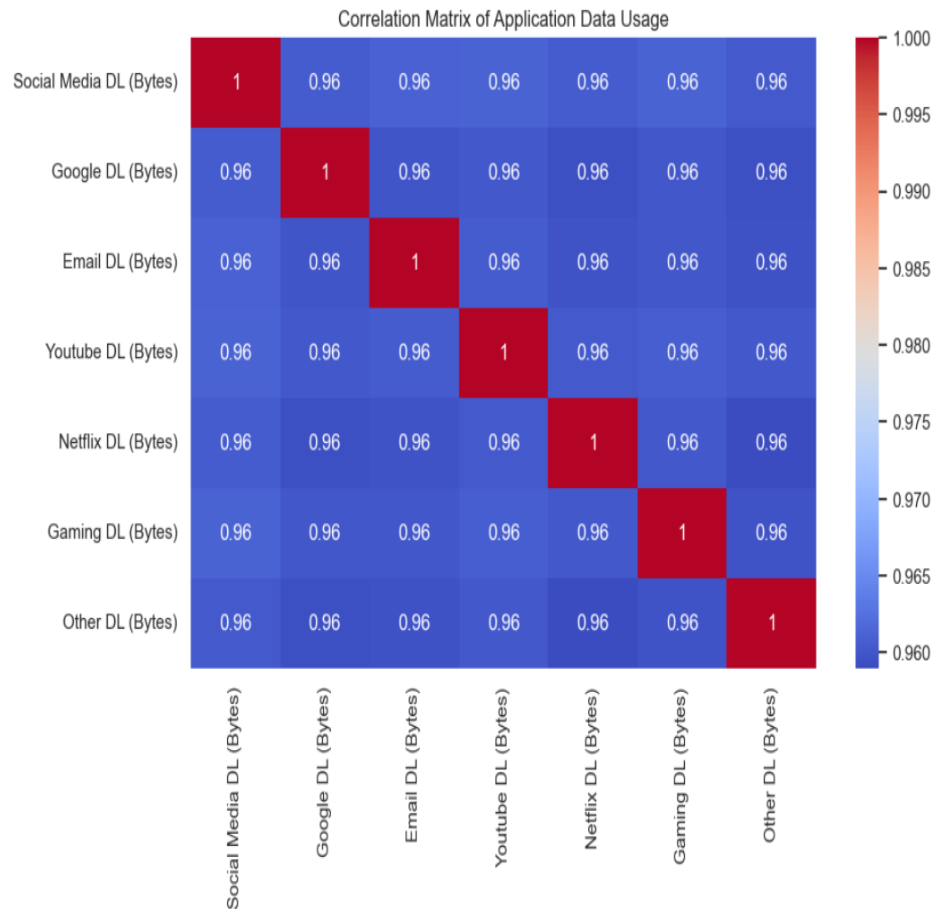
User Engagement Analysis

- Metrics: session count, duration, data
- Graph: Top 10 users by each metric (table or bar)

Clustering on Engagement
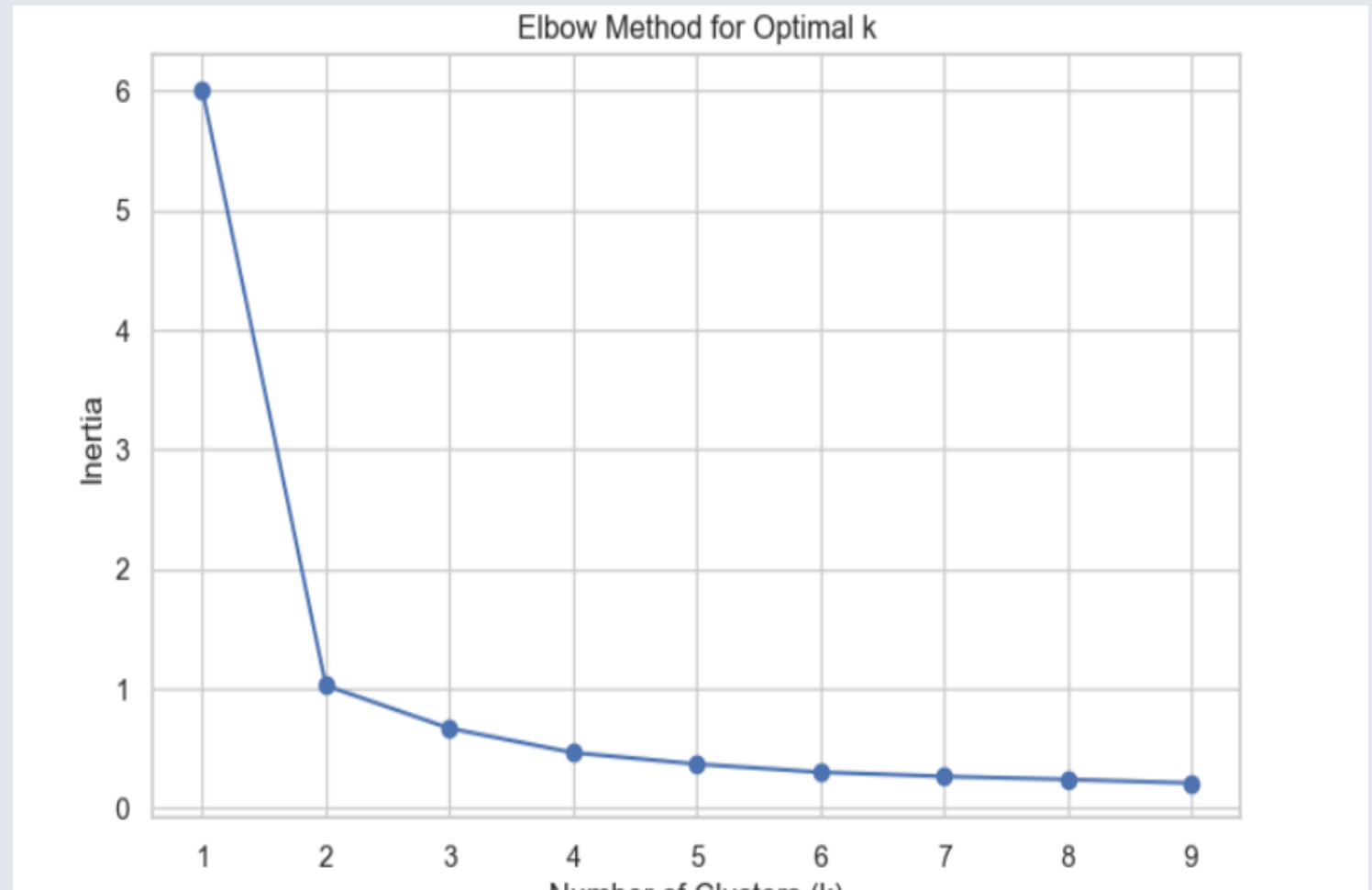
- Method: KMeans (k=3)

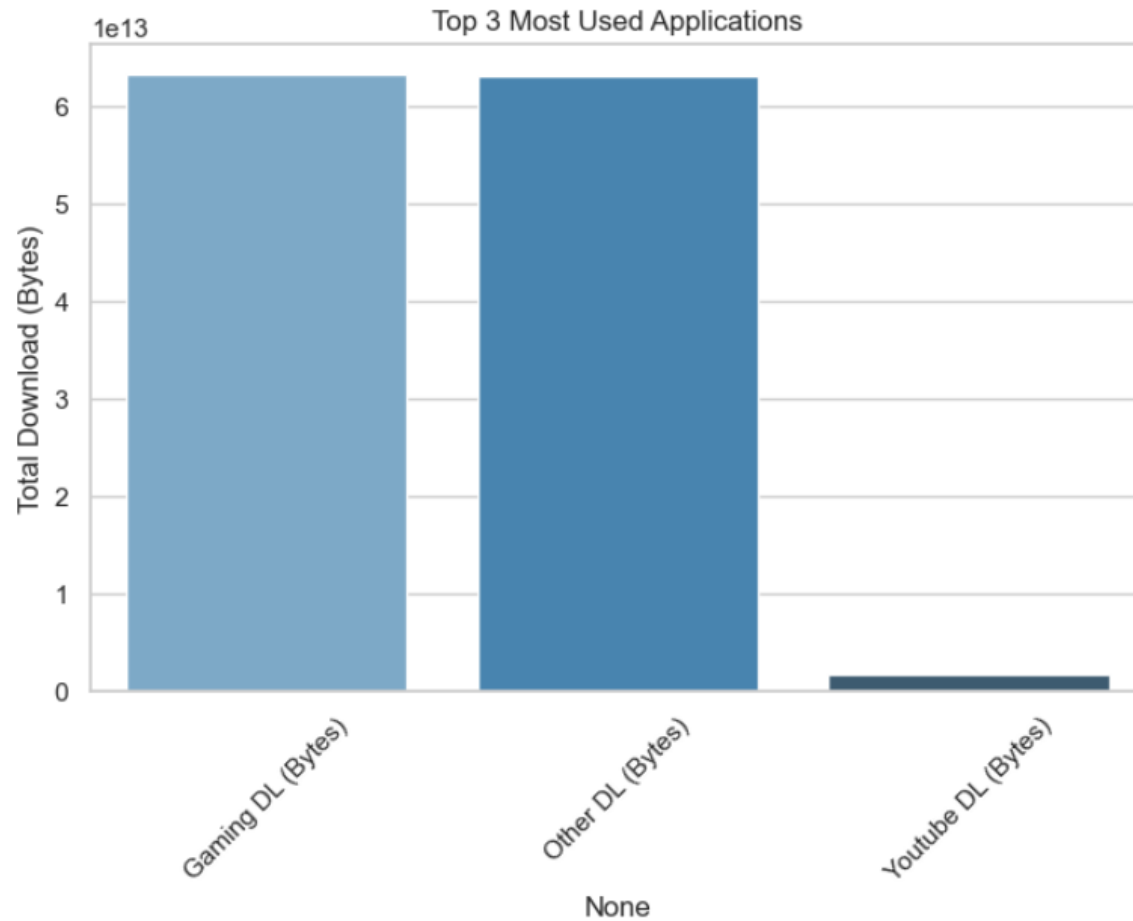- Plot: Engagement clusters

- Summary: Low, Medium, High users

User Clusters based on Engagement

Elbow Method for K Selection

- Plot: Inertia vs k (elbow curve)

- Finding: Optimal k = 3

Elbow Method for Optimal k

App Engagement & Usage

Top 3 Most Used Applications

- GRAPH: TOP 3 MOST USED APPS (BAR)
- TABLE: TOP 10 USERS PER APP
- INSIGHT: ENTERTAINMENT APPS LEAD

Download Throughput by Handset Type

Network Experience Metrics
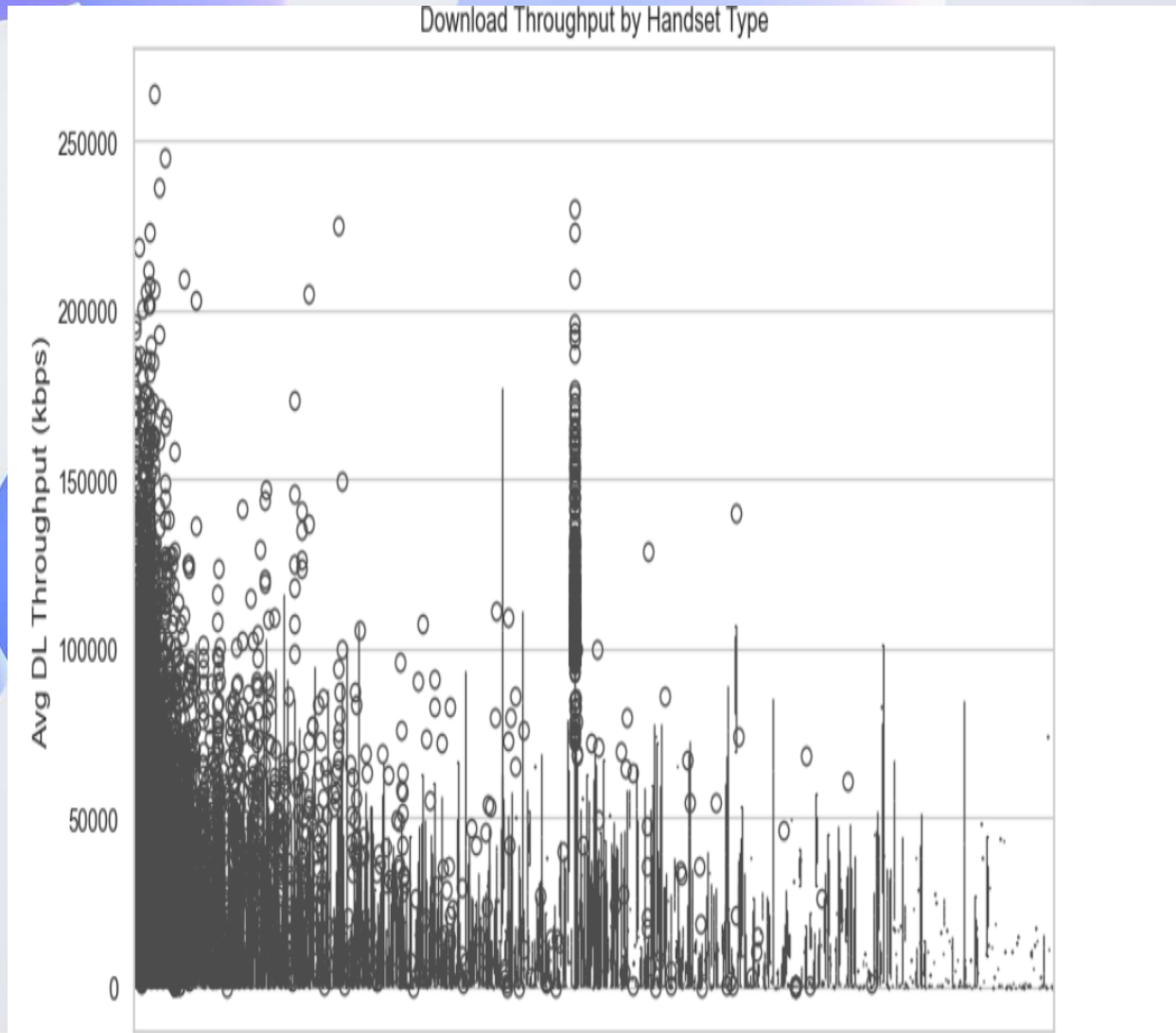
- AGGREGATED: AVG RTT, TCP RETRANSMISSION, DL/UL THROUGHPUT
- BOXPLOTS: DL SPEED & TCP RETRANSMISSION BY HANDSET

Experience Clustering

- KMeans clustering of users based on experience
- Clusters defined: Good, Average, Poor network quality

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Experience Cluster Summary:
                   Avg TCP Retransmission  Avg RTT (ms)  Avg DL TP (kbps)  \
Experience Cluster
0                           1.656163e+07    127.656247       2852.635101
1                           2.859611e+07     82.640229      41536.261961
2                           5.628666e+07     79.762108      56771.344782

                   Avg UL TP (kbps)
Experience Cluster
0                        358.312843
1                       3332.930721
2                      18119.336144
```
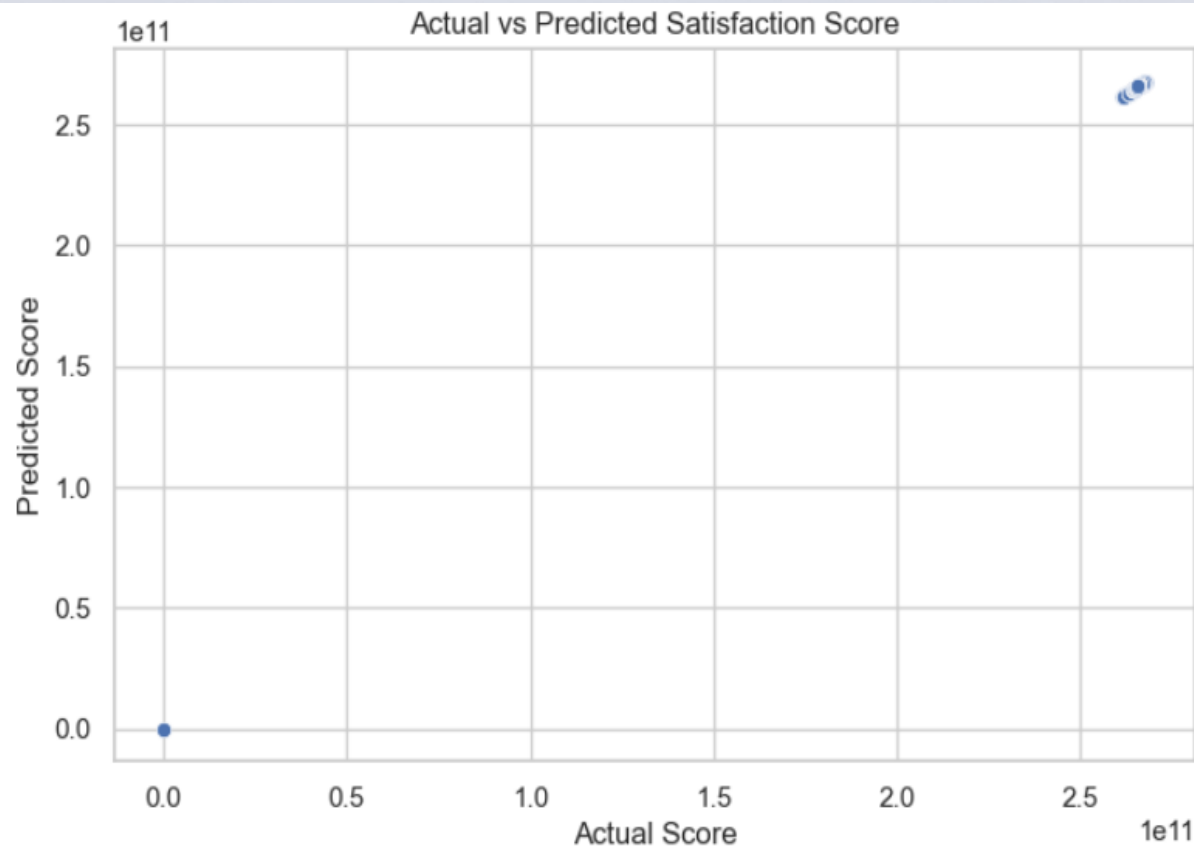
Satisfaction Score Calculation

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Top 10 Satisfied Users:
       MSISDN/Number   Satisfaction Score
70079  3.366877e+10        2.678804e+11
85785  3.369858e+10        2.678060e+11
32273  3.365871e+10        2.677302e+11
48341  3.366240e+10        2.677055e+11
43629  3.366131e+10        2.677021e+11
58026  3.366491e+10        2.676693e+11
98211  3.376264e+10        2.676376e+11
31942  3.365863e+10        2.675561e+11
70421  3.366890e+10        2.675238e+11
37810  3.365990e+10        2.675091e+11
```

- Euclidean distance from worst cluster
- Combined score = (engagement + experience) / 2
- Table: Top 10 satisfied users

Regression Model & Score Prediction

- LINEAR REGRESSION TO PREDICT SATISFACTION

- R^2 SCORE AND COEFFICIENTS SHOWN

- ACTUAL VS PREDICTED GRAPH

- KMEANS (K=2) ON SATISFACTION SCORE

Conclusion & Recommendation

- TELLCO SHOWS STRONG USER ENGAGEMENT & DEMAND

- KEY STRENGTHS: APP ACTIVITY, LOYAL USER BASE, STABLE EXPERIENCE

- LIMITATION: ONLY 1-MONTH DATA, NO REVENUE INFO

- FINAL RECOMMENDATION: INVEST IN TELLCO