

Mobile Device Usage and User Behavior

Abstract

The dataset utilized for this analysis was sourced from Kaggle and focuses on cell phone usage and user behavior. This dataset was chosen due to the ubiquitous presence of mobile phones in our daily lives, serving purposes ranging from professional tasks and content creation to social media engagement. Cell phones have become indispensable in daily activities and even serve as a primary source of income for some individuals. The analysis was conducted using SAS Studio for data cleaning and exploration.

This analysis aimed to examine key relationships within the dataset. A linear regression analysis was performed to assess the impact of app usage on battery drain, revealing that increased app usage significantly accelerates battery depletion. A t-test comparing data usage between Android and iOS operating systems showed no substantial difference in usage patterns. Additionally, a chi-square test demonstrated a significant association between gender and user behavior, with males exhibiting a slightly higher proportion of engagement compared to females. All tests are performed with an alpha of 0.05.

Introduction

Research question

- 1: How does app usage impact the battery life of smartphones?
- 2: Are there differences in data utilization patterns between Android and IOS users?
- 3: Which gender utilizes their phones more?

Objective

I have three objectives for this analysis:

- 1: To identify the key factors contributing to battery drain.
- 2: To determine whether data usage differs between Android and IOS users.

3: To understand whether males or females exhibit similar or different behavior patterns.

Importance

Cell phone users can utilize the findings, narrow it down by the apps that drain the battery more, and optimize battery performance for those apps. They can improve power-saving technologies and work on app software efficiency. Users can look at these findings when shopping for a new phone and utilize the data to decide when choosing which operating system to purchase.

Data Selection and Preparation

Dataset Overview: The dataset has 700 observations and 11 variables; it includes phone models, operating systems, gender, age, data usage, etc....

Variable Selection

Categorical Variable: Device Model, Operating System, Gender, User Behavior Class

Numerical Variable: Battery Drain, App Usage, Screentime, Data Usage

Data Cleaning

I used SAS Studio to change one of the numerical variables (User Behavior Class) to a categorical variable. I modified the variable names for better analysis, removed duplicate and missing data.

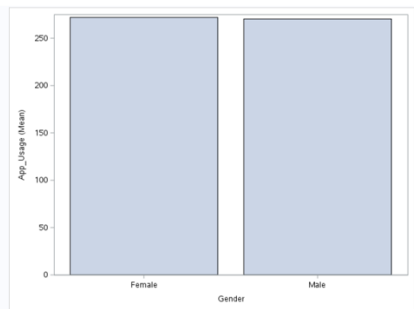
Data Analysis

I conducted a correlation analysis to examine relationships between my numerical variables (battery drain, app usage, screen time, and data usage). The p-value for all the variables is less than 0.05, meaning all the correlations are statistically significant.

| The CORR Procedure | | | | | | |
|--|-----|-----------|-----------|---------|-----------|-----------|
| 4 Variables: App_Usage Screenshot Battery_Drain Data_Usage | | | | | | |
| Simple Statistics | | | | | | |
| Variable | N | Mean | Std Dev | Sum | Minimum | Maximum |
| App_Usage | 700 | 271.12857 | 177.19948 | 189790 | 30.00000 | 598.00000 |
| Screenshot | 700 | 5.27271 | 3.06858 | 3691 | 1.00000 | 12.00000 |
| Battery_Drain | 700 | 1525 | 819.13641 | 1067611 | 302.00000 | 2993 |
| Data_Usage | 700 | 929.74286 | 640.45173 | 650820 | 102.00000 | 2497 |

| Pearson Correlation Coefficients, N = 700 | | | | |
|---|-------------------|-------------------|-------------------|-------------------|
| Prob > r under H0: Rho=0 | | | | |
| | App_Usage | Screenshot | Battery_Drain | Data_Usage |
| App_Usage | 1.00000 | 0.95033 <.0001 | 0.95638 <.0001 | 0.94231 <.0001 |
| Screenshot | 0.95033 <.0001 | 1.00000 | 0.94898 <.0001 | 0.94132 <.0001 |
| Battery_Drain | 0.95638 <.0001 | 0.94898 <.0001 | 1.00000 | 0.93228 <.0001 |
| Data_Usage | 0.94231 <.0001 | 0.94132 <.0001 | 0.93228 <.0001 | 1.00000 |

I created a histogram of my gender variable and found that both genders are equally distributed in the dataset.

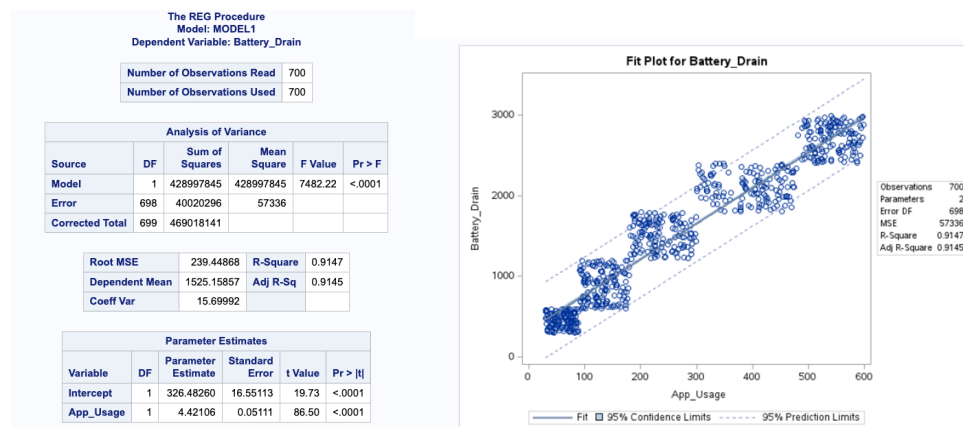


Hypothesis 1

H0: There's no relationship between App Usage and battery drain.

H1: There is a significant relationship between App usage and battery drain.

Test: Single Linear Regression

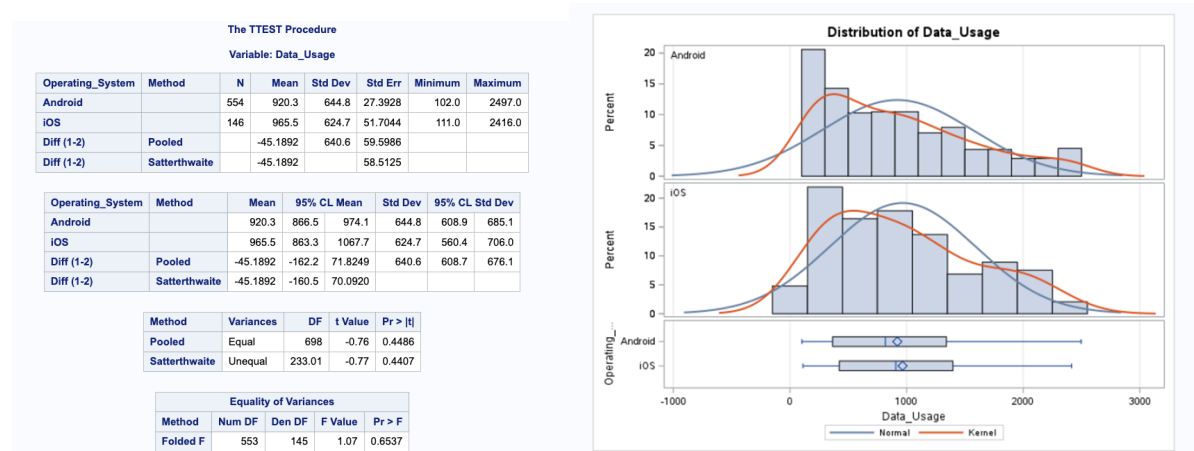


Hypothesis 2

H0: The average data usage is the same across different operating system.

H1: the average data usage differs between operating systems.

Test: t-test

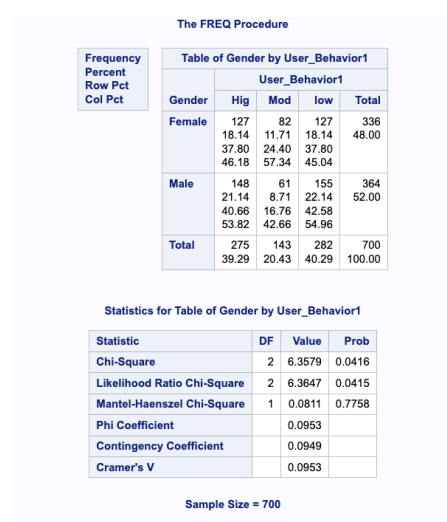


Hypothesis 3

H0: There is no association between user behavior and gender.

H1: There is an association between user behavior and gender.

Test: chi-square



Interpretation of Results

#1 Decision: P-value is less than 0.0001 which is less than 0.05 there I reject my null hypothesis.

Based on the slope formulation of the linear regression $326.48 + 4.42x$, the positive slope suggests there is a strong relationship between app usage and battery drain. The R-square being 0.9147 also explains it. Increased app usage substantially affects battery drain, meaning that the more apps you use on your phone, the faster your phone lose battery.

#2 Decision: p-value is greater than 0.05 therefore, I fail to reject my null hypothesis. There is no statistical significance between the mean data usage in the two operating systems.

both operating systems' data usage is right-skewed. This indicates that both operating system users have similar data usage.

#3 Decision: p-value is 0.0416, less than 0.05 therefore, I reject the null hypothesis. I conclude that there is statistical significance in the relationship between gender and usage behavior. Males show a slightly higher proportion in usage behavior than females, thus gender is significantly associated with user behavior.

Limitation

The dataset could have included the different apps the time spent on each app and some other variables to make the study more detailed. Overall, I had no issues working with this dataset, however, being able to isolate different apps with screentime would have made this analysis more interesting and more informative.

Conclusion

The result indicated that app usage does impact battery drain. Device manufacturers can use the findings to enhance the battery performance of smartphones and find ways to help users maximize their battery life. For further studies, it would be interesting to look into age compared to specific app usage and compare age to screen time to see if a certain age group utilizes their phones more or less.