

CS 210 Term Project

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Motivation

I have used my own cellphone's screen time data for this project. My real motivation about this project is, I can work with my own data and analyze myself instead of irrelevant data. Since I always try to lower my screen time, this project has gave me some valuable analysis about my behaviors and what I should be careful about for lowering my screen time.

Data Source

I got my data from my cellphone's "settings/Screen Time/Detailed Screen Time" part. I have created a template according to the data that I can have and extracted the data for different weeks.

Data Analysis

After I have arranged my data, I have started coding with some explorations. First of all I needed to explore the data with;

- `df.head()`
- `df.info()`
- `df.describe()`

After successfully exploring my data, I have dropped the NA values with `df.dropna()`.

Most significant problem about my dataset was, duration of screen time was in this format: XXH XXM (13H 05M). I have handled this problem with converting everything to minutes so I had clean and stable data.

Visualizations:

After I have had my clean data, I visualized important metrics to different kind of charts, such as pie chart, bar chart or line chart. Visualizations will be in the Findings part.

Analysis:

Visualizations made me understand more about the data and trends that I can discover. My first discovery is, Relationship between Notification Count and its affect for Screen Time for matching applications.

I used Mean for Screen Time durations and Notification Count for various types. This gave significant insight about my behaviors for different applications.

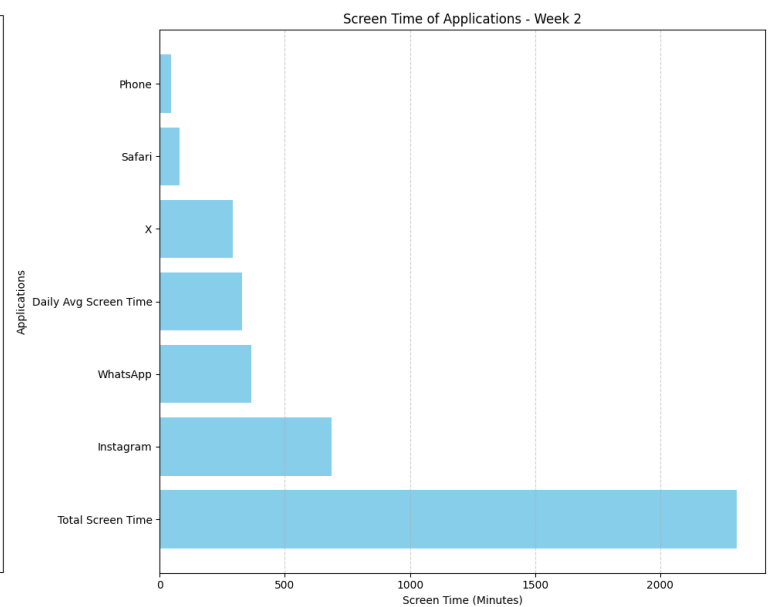
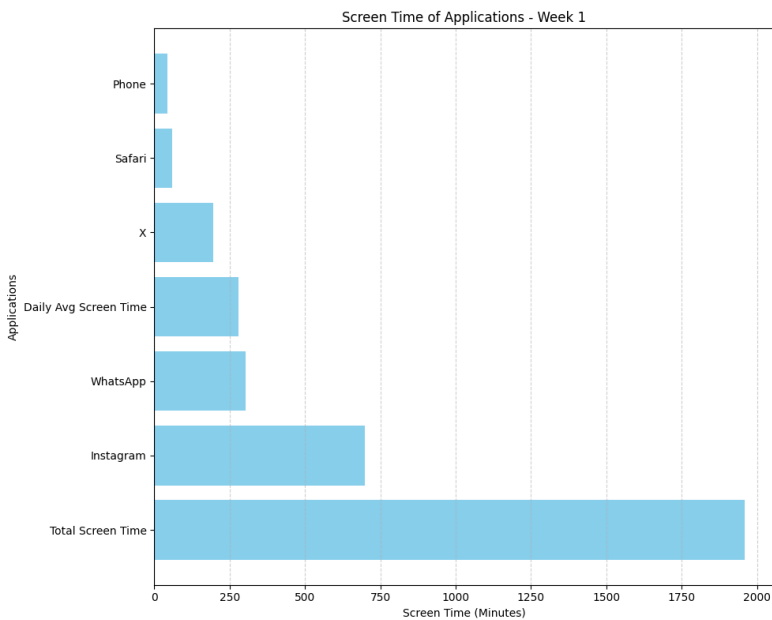
Machine Learning:

I used some Machine Learning techniques for for my screen behaviors. I started with correlation analysis for notification count and screen times.

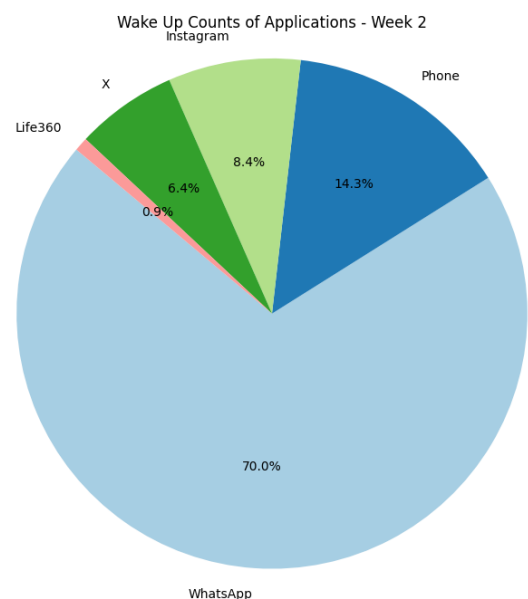
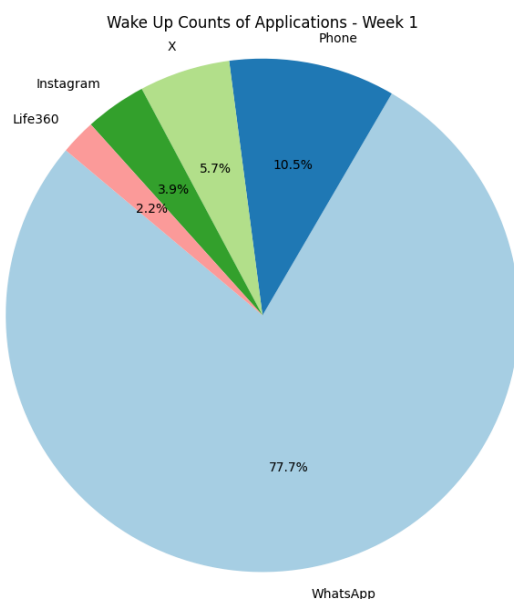
Other technique that I used for Machine Learning part is “Anomaly Detection” I will be explaining more about it in the upcoming part.

Findings

This is the most important part of the project since I have discovered some valuable insights about myself.

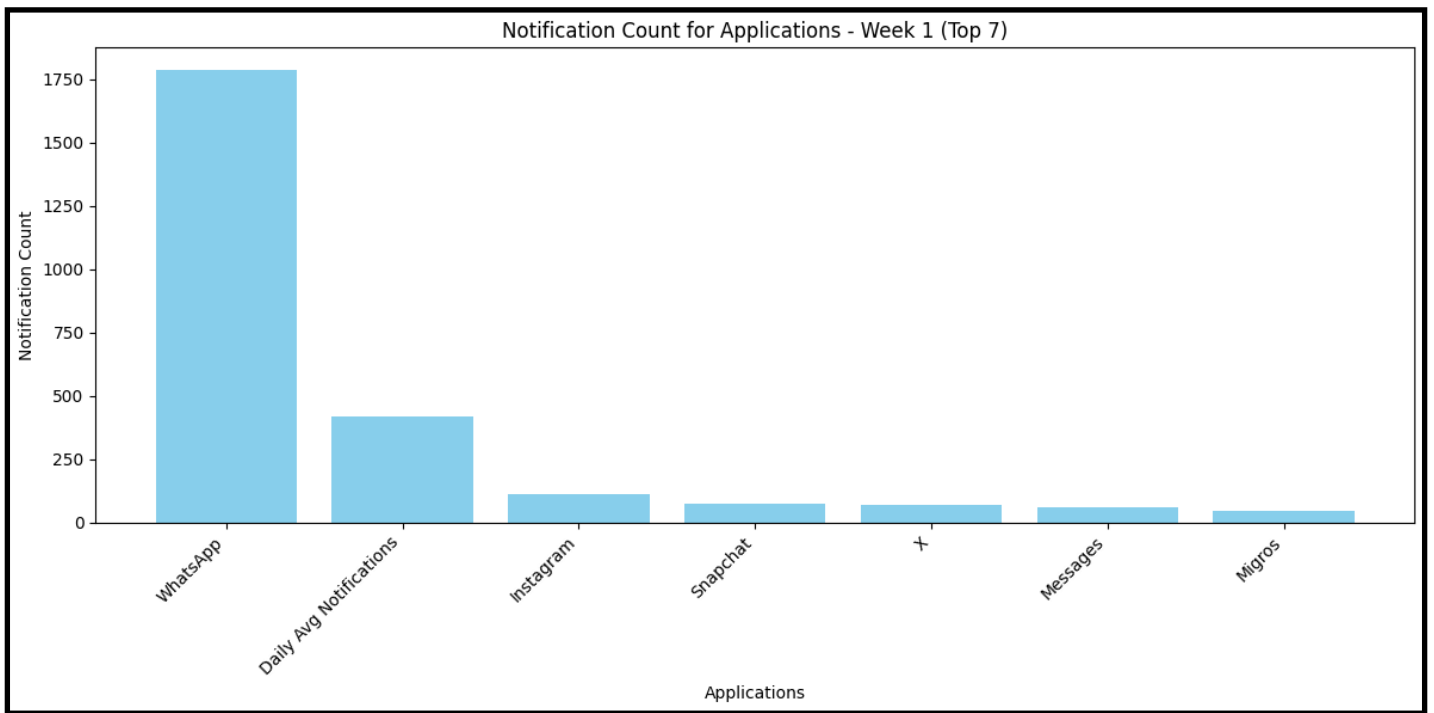


Above figures stands for screen times of applications that I use. In both weeks, WhatsApp and Instagram screen times are higher than Daily Average Screen Time. This means that I spend a lot of time using these both and we can see that these two nearly have half of my screen time.

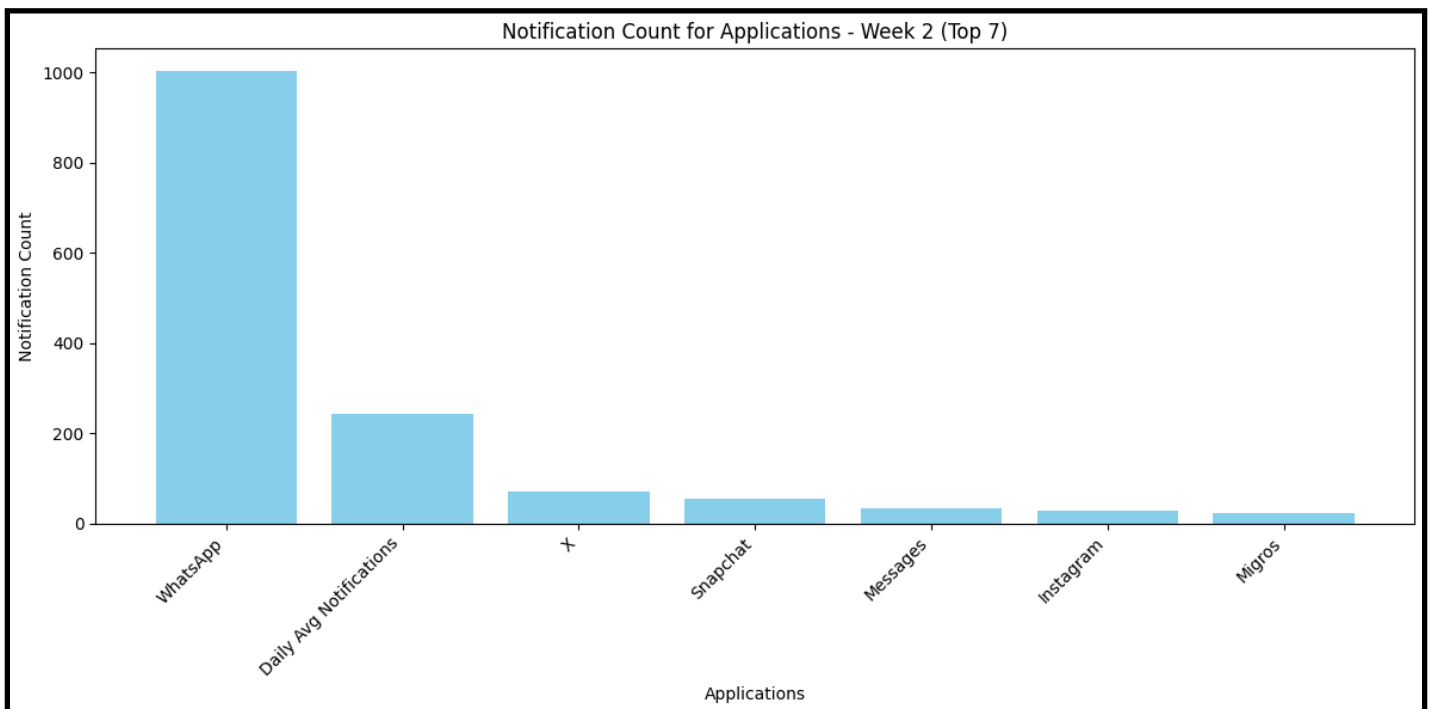


For the wake up counts of applications, WhatsApp leads with 77% but Phone has large amount of the pie despite others.

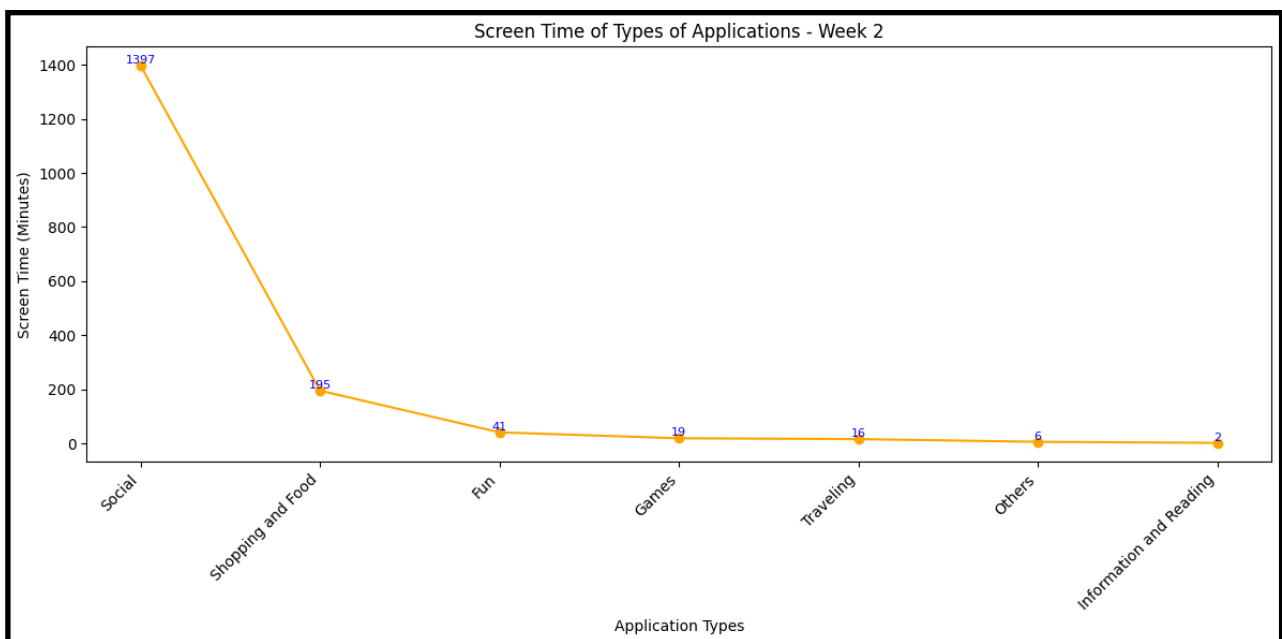
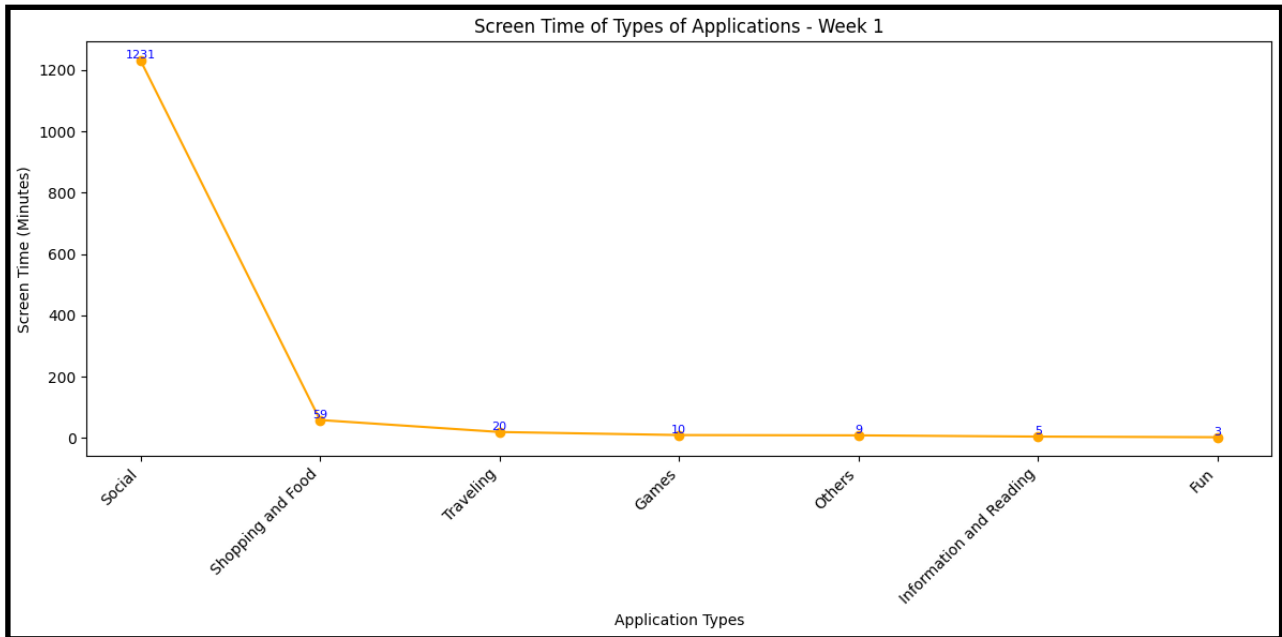
For Week 2, percentage of WhatsApp decreased by 7%.



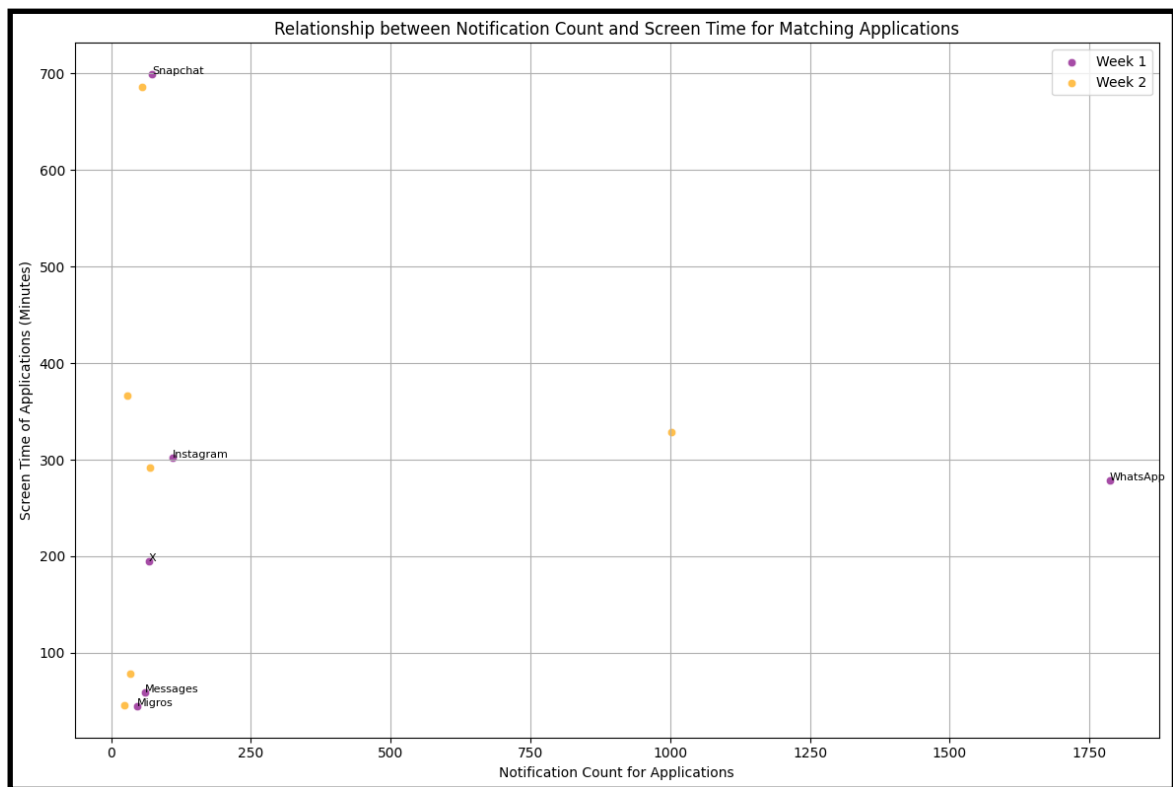
WhatsApp is the leading application in terms of number of Notifications. Notification count for WhatsApp is nearly 5 times of Daily Average Notifications. This clearly explains that, I respond to the WhatsApp messages before I do anything else on my phone. (Since WhatsApp has the largest piece in the pie chart of wake up counts)



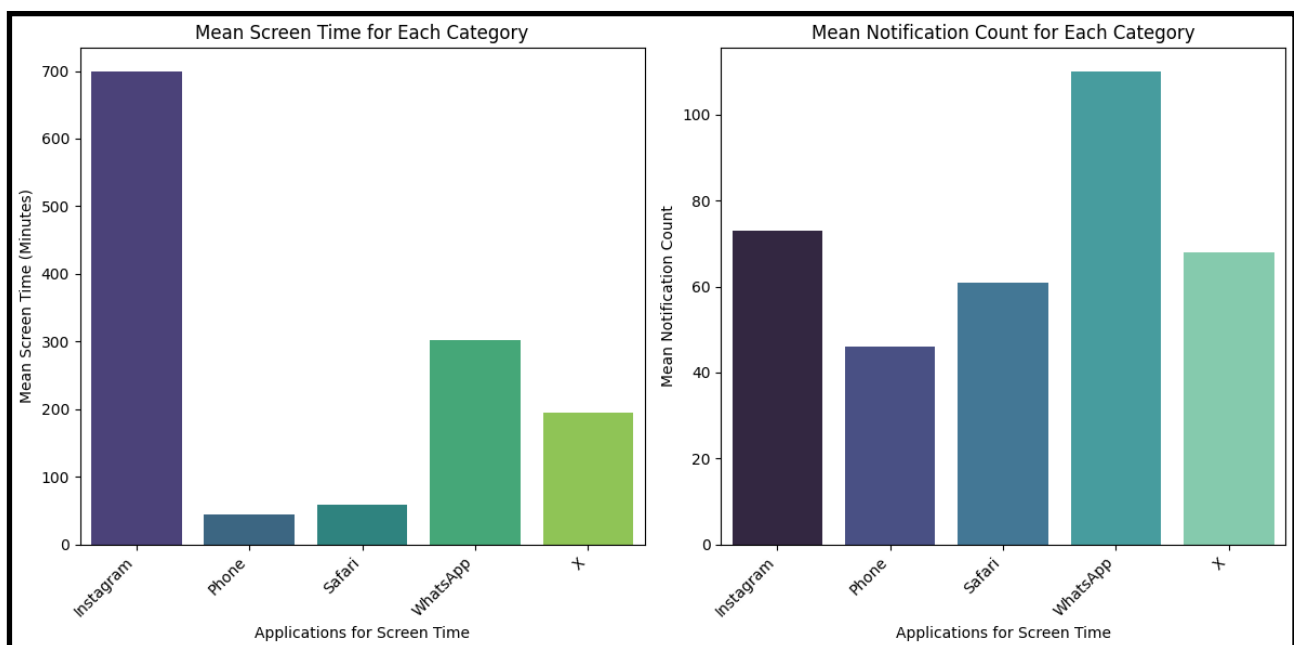
Graph of Week2, supports the above idea. Number of notifications decreased significantly and my wake up percentage for 2 has decreased 7% too.



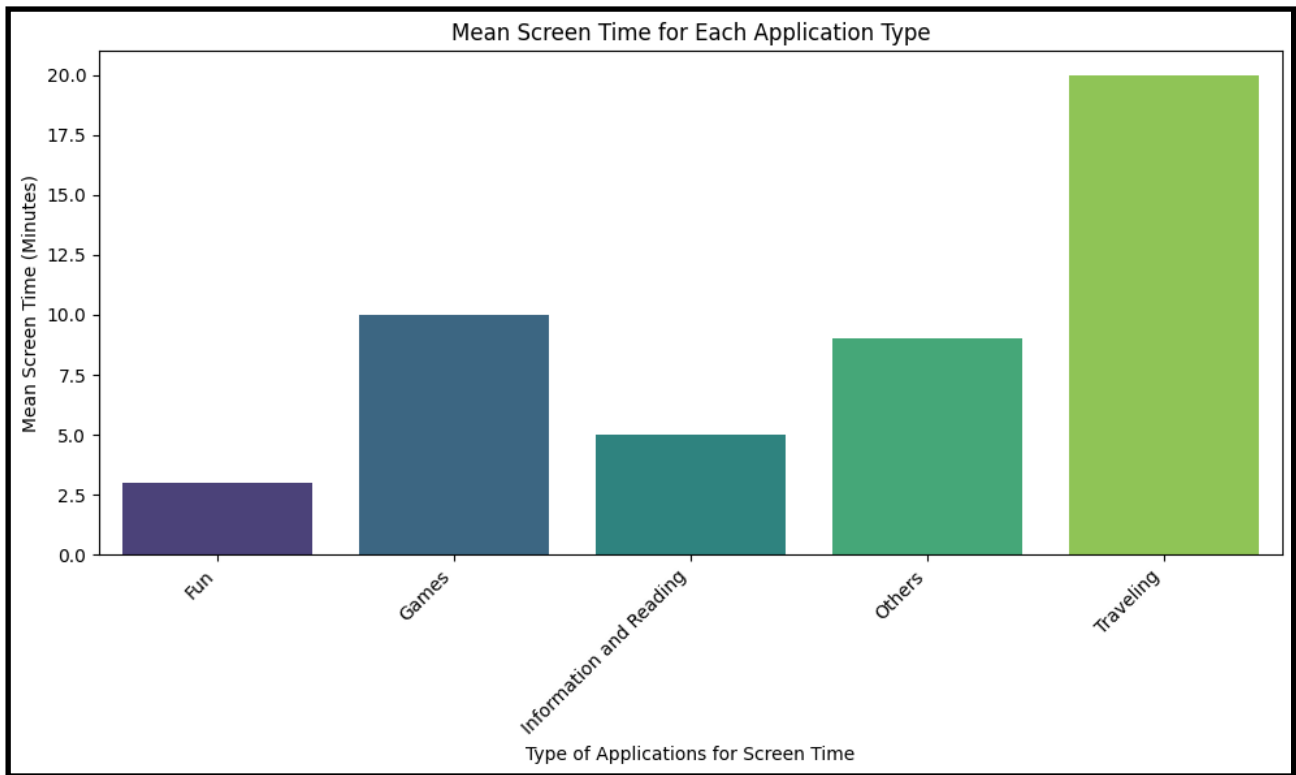
Screen times of different types of applications shows that, I mostly use my phone for social activities (WhatsApp, X, Instagram...) Second type of applications is Shopping and Food, the reason for this situation is, I order my food from outside, since I feel hungry, I regularly open the food delivery applications and check for the meal's status. Didn't expect that to be that much honestly.



This is an important graph that gives me important insight. The graph stands for Relationship between Notification Count and Screen Time for Matching Applications. Snapchat has the greatest ratio above others. Notification count for Snapchat is low. However, it has larger screen time compared to other applications that send notifications too. This clearly explains that, my reaction for Snapchat is greater than all other applications even WhatsApp. WhatsApp has the greatest notification count but screen time is low compared to that.



Mean Screen Time graph (on the left) supports the category based screen time graph. Mean times of applications I use is mostly social media applications. Mean Notification Count graph (on the right) shows that when we consider mean notification counts, Instagram and X stands with WhatsApp side by side. This graph supports our theory above: "Notification count affects screen time of applications"

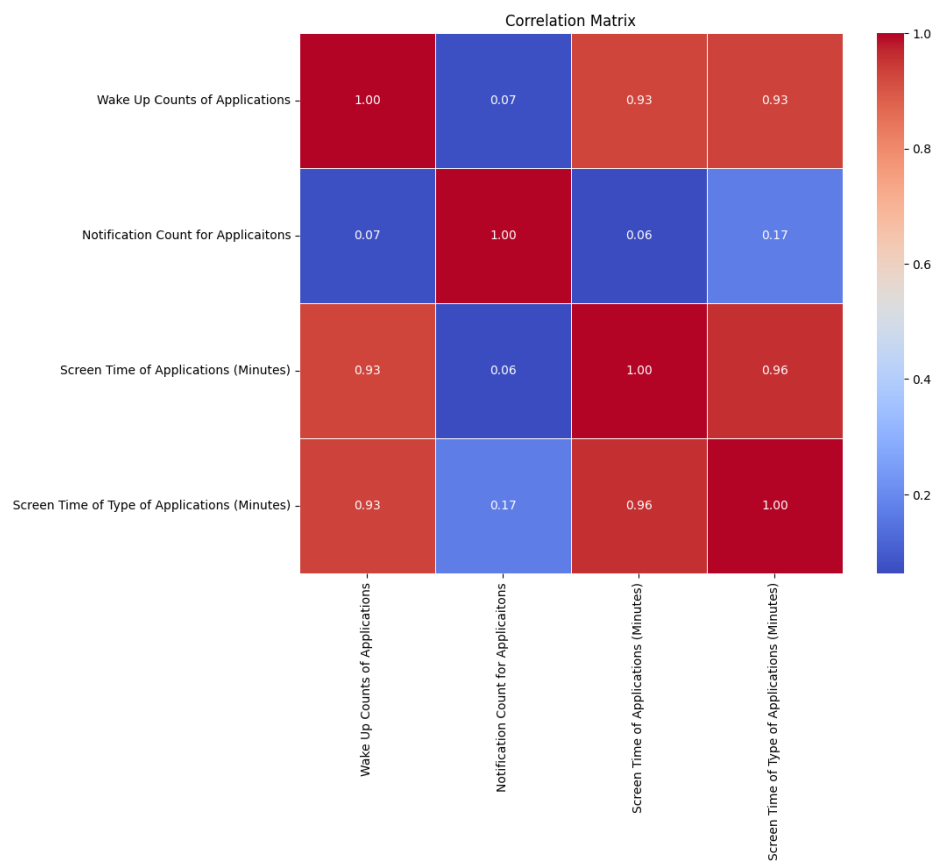
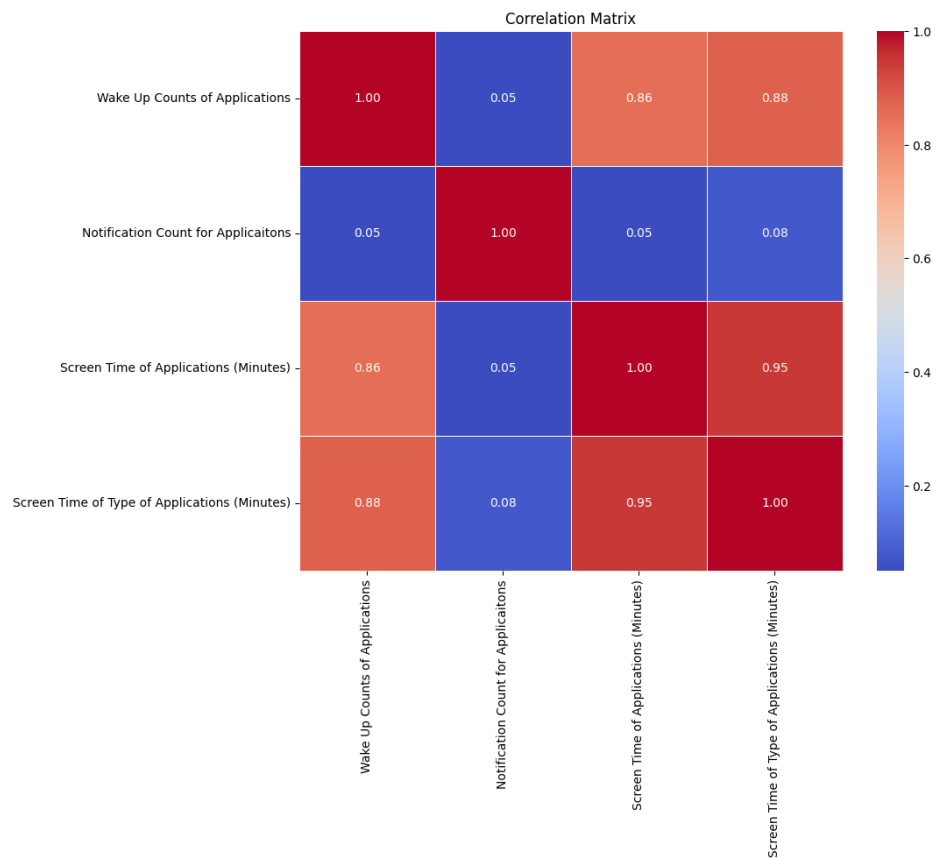


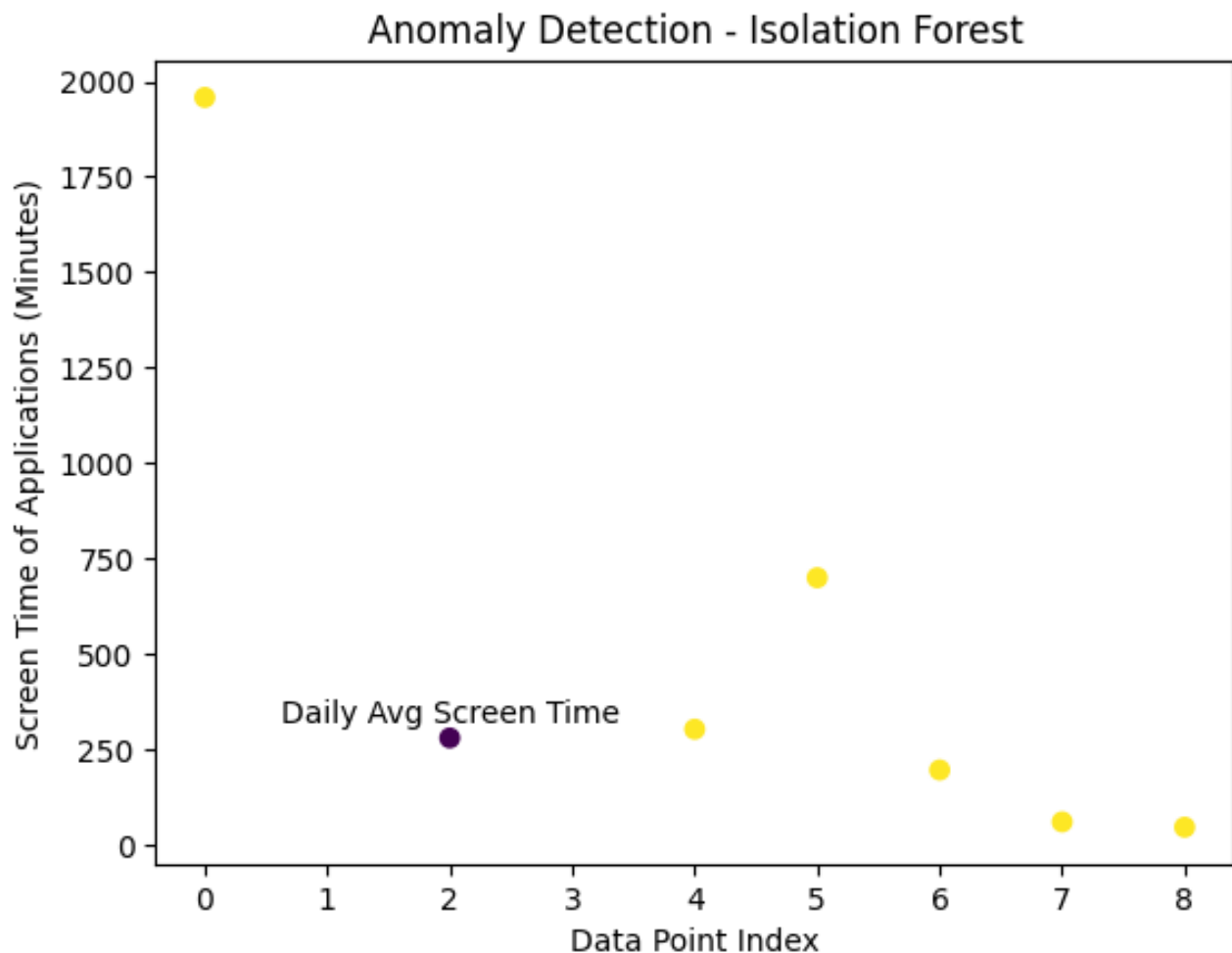
Mean Screen Time for Each Application Type graph comes with different insight. Even though traveling applications don't send me notifications, their screen time is higher when we take the mean. It means that, even if they don't send me notifications or remind themselves to me, when I need those applications I use them.

A	B	C	D	E	F	G	H
Applications for Screen Time	Screen Time of Applications	Applications for Wake Ups	Wake Up Counts of Applications	Applications for Notifications	Notification Count for Applications	Type of Applications for Screen Time	Screen Time of Type of Applications
Total Screen Time	38h 25m	Total Wake Ups	1702	Daily Avg Notifications	242	Social	23h 17m
Difference From Last Week		0,26 Difference From Last Week		-0,12		Productivity and Finance	57m
Daily Avg Screen Time	5h 29m	Daily Avg Wake Ups		243 WhatsApp		1003 Shopping and Food	3h 15m
				Telegram		212 Creativity	35m
WhatsApp	6h 06m	WhatsApp		643 Instagram		29 Traveling	16m
Instagram	11h 26m	Phone		131 Snapchat		55 Games	19m
X	4h 52m	X		59 X		70 Others	6m
Safari	1h 18m	Instagram		77 Messages		35 Information and Reading	2m
Phone	46m	Life360		8 Migros		23 Fun	41m
Yemeksepeti	44m	Safari		22 Trendyol		50	
Akbank	27m	Akbank		39 Life360		29	
Twitch	31m	Settings		0 Getir		14	
Mail	7m	Mail		21 MaximumMobil		0	
Migros	1h 12m	Clock		94 Mail		21	
Life360	6m	Snapchat		14 Clock		10	
Binance	8m	Yemeksepeti		28 Clash of Clans		26	
Clash of Clans	19m	Binance		5 Yemeksepeti		16	
Photo Album	1m	Migros		32 Youtube		7	
Settings	3m	Maps		3 Sahibinden		1	
Snapchat	8m	Camera		3 Phone		15	
Maps	2m	McDonald's		0 CoinStats		12	
LinkedIn	26m	Photo Album		1 File Market		0	
Google Maps	1m	E-komobil		22 Akbank		12	
Clock	22m	App Store		0 Tikla Gelsin		0	
Youtube	41m	Messages		4 LinkedIn		9	
Camera	3m	Google Maps		0 Binance		3	
Garanti BBVA	0m	Clash of Clans		3 Health		4	
E-komobil	10m	Calculator		21 Iscep		5	
Getir	32m	Youtube		0 Turkcell		4	
Trendyol	44m	Otobusum Nerede?		6 Coffy		5	

This is small part of the data I extracted.

Correlation Matrix Graphs





Limitations and Future Work:

Limitations:

- While the correlation analysis provides insights into the relationship between notification count and screen time, it might not capture the full complexity of my behavior. Other factors influencing screen time, such as the context of notifications, could be explored for a more nuanced understanding.
- The analysis is based solely on screen time data obtained from the cellphone's settings. Other contextual factors influencing screen time, such as location, mood, or specific activities during screen usage, were not considered. Incorporating additional data sources or contextual information could provide a more comprehensive understanding of the factors influencing screen time.

Future Work:

- Enhance data collection methods to include more detailed information about specific applications or categories. This could involve integrating additional data sources or using specialized applications for more granular insights.
- Develop a more comprehensive user behavior profiling system that considers various aspects like location, time of day, and my activities. This can provide a holistic view of screen time patterns and contribute to more personalized recommendations.

Output of Exploration part of the code:

```
Exploration of the dataset of Week 1
Applications for Screen Time Screen Time of Applications \
0      Total Screen Time      32h 38m
1      Difference From Last Week      09:50:24
2      Daily Avg Screen Time      4h 39m
3      NaN      NaN
4      WhatsApp      5h 02m

Applications for Wake Ups Wake Up Counts of Applications \
0      Total Wake Ups      1961.00
1      Difference From Last Week      1.47
2      Daily Avg Wake Ups      280.00
3      NaN      NaN
4      WhatsApp      1046.00

Applications for Notifications Notification Count for Applicaitons \
0      Daily Avg Notifications      421.0
1      NaN      NaN
2      WhatsApp      1786.0
3      Telegram      399.0
4      Instagram      110.0

Type of Applicaitons for Screen Time Screen Time of Type of Applications
0      Social      20h 31m
1      Productivity and Finance      1h 15m
2      Shopping and Food      59m
3      Creativity      42m
4      Traveling      20m
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 39 entries, 0 to 38
Data columns (total 8 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   Applications for Screen Time           35 non-null    object
1   Screen Time of Applications           35 non-null    object
2   Applications for Wake Ups             38 non-null    object
3   Wake Up Counts of Applications        38 non-null    float64
4   Applications for Notifications        34 non-null    object
5   Notification Count for Applicaitons   34 non-null    float64
6   Type of Applicaitons for Screen Time  9 non-null     object
7   Screen Time of Type of Applications   9 non-null     object
dtypes: float64(2), object(6)
memory usage: 2.6+ KB
None
Wake Up Counts of Applications Notification Count for Applicaitons
count      38.000000      34.000000
mean       100.012368      98.823529
std        355.302504      312.917597
min         0.000000      1.000000
25%         1.602500      7.500000
50%         4.500000      19.000000
75%        23.500000      35.750000
max        1961.000000     1786.000000
//////////////////////////////////////////////////////////////////

Exploration of the dataset of Week 2
Applications for Screen Time Screen Time of Applications \
0      Total Screen Time      38h 25m
1      Difference From Last Week      0.26
2      Daily Avg Screen Time      5h 29m
3      NaN      NaN
4      WhatsApp      6h 06m

Applications for Wake Ups Wake Up Counts of Applications \
0      Total Wake Ups      1702.00
1      Difference From Last Week      -0.12
2      Daily Avg Wake Ups      243.00
3      NaN      NaN
4      WhatsApp      643.00

Applications for Notifications Notification Count for Applicaitons \
0      Daily Avg Notifications      242.0
1      NaN      NaN
2      WhatsApp      1003.0
3      Telegram      212.0
4      Instagram      29.0

Type of Applicaitons for Screen Time Screen Time of Type of Applications
0      Social      23h 17m
1      Productivity and Finance      57m
2      Shopping and Food      3h 15m
3      Creativity      35m
4      Traveling      16m
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 39 entries, 0 to 38
Data columns (total 8 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   Applications for Screen Time           35 non-null    object
1   Screen Time of Applications           35 non-null    object
2   Applications for Wake Ups             38 non-null    object
3   Wake Up Counts of Applications        38 non-null    float64
4   Applications for Notifications        34 non-null    object
5   Notification Count for Applicaitons   34 non-null    float64
6   Type of Applicaitons for Screen Time  9 non-null     object
7   Screen Time of Type of Applications   9 non-null     object
dtypes: float64(2), object(6)
memory usage: 2.6+ KB
None
Wake Up Counts of Applications Notification Count for Applicaitons
count      38.000000      34.000000
mean       84.023158      56.235294
std        291.408748      175.659805
min        -0.120000      0.000000
25%         1.000000      1.500000
50%         3.500000      11.000000
75%        26.500000      28.250000
max        1702.000000     1003.000000
```