

**Analysis on Data Usage Before and After**

**Major Software Update**

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**Abstract:** We are collecting data from NetMob 2023 Dataset about Clash of Clans and Fortnite. The dataset that NetMob 2023 provides the data usage of a 77 days range from 16th of March 2019 to 30th of May 2019 in several cities in France, geo-referenced to 870,000 tiles of 100x100 square meters, and contains over 440 billion data points.

**Agenda**

Agenda ………………………………………….1

Introduction ……………………………………. 1

Problem statement …………………………..…. 1

Dataset size and description ……………...……. 1

Literature review …………………………….… 1

Data analysis and diagrams ………………….…..2

Conclusion .…………………………….………..3

Future work ………………………….………….3

**Introduction**

In an era where digital connectivity and mobile applications dominate daily life, understanding the impact of software updates on data usage is crucial for both developers and users. NetMob 2023 provides an excellent platform for examining these dynamics by offering comprehensive mobile network data. This project aims to leverage data from NetMob 2023 to analyze the data usage patterns of two popular mobile games, "Clash of Clans" and "Fortnite," before and after a significant software update. By focusing on specific time frames the day before the update, the day of the update, and the day after the update we aim to uncover how updates influence data consumption. The study will be conducted in two cities Paris and Dijon providing a comparative analysis.

**Problem Statement**

Software updates can significantly impact user engagement and data usage, which in turn affects user experience and network load. However, the precise effects of these updates on mobile data consumption, particularly in terms of prolonged usage due to favourable updates, are not well understood for gaming applications like "Clash of Clans" and "Fortnite". So, we will collect and analyze data from NetMob 2023, focusing on the specified timeframes (updates date). The insights gained from this analysis will help developers understand the impact of their updates on user engagement and assist network operators in managing traffic effectively during these critical periods.

**Data Size and Description**

The data size that we are working on is from to cities (Paris and Dijon), and they are from first of April to third of April for Clash of Clans and from eighth of May to tenth of May. The data size contains of information about data usage, and they are represented as follows the data are collected every 15 minutes throw the day. The data are collected from tiles of 100x100 square meters, and they are observed every 15 minutes. So, the file features contain of tile\_id and the time represented in 96 feature each feature is a span of 15 minutes. To make its simpler to calculate and evaluate data we added all tiles together and worked on it as a whole city. Not only that, but also, we compressed every four 15 minutes to together to for the data in shape of hours to be as follows:



**Literature Review**

The relationship between software updates and data usage is complex and depends on several factors, including the nature of the update and user behavior. Studies have indicated that major updates often result in increased data usage as users download new content and engage more deeply with the application. For example, research by Xu et al. (2016) observed that updates in mobile games lead to spikes in data traffic due to the download of new assets and increased user activity. Moreover, user behavior surrounding updates can vary. A study by Kim et al. (2019) found that data usage patterns can shift significantly around the time of updates, with users often increasing their usage in the days leading up to and following an update. This behavior suggests a heightened interest and engagement with the application during these periods, potentially driven by anticipation and exploration of new features (Kim et al., 2019). So, from the help of NetMob 2023 dataset. We will gather information and analysis on multiple cities and multiple games.

**Data Analysis and Diagrams**

We have done analysis on Clash of Clans and Fortnite in both cities Paris and Dijon and came out with these results.

**Dijon clash of clans:**

A graph of blue lines

Description automatically generatedA graph of a number of blue bars

Description automatically generated with medium confidenceA graph of a number of blue bars

Description automatically generated

In the day before the update the data usage peaked in 1 to 2 pm with a value of **4196782** and **4381740**, and the mean of the total day was **2490375.46**

The day of the update the data usage peaked in 1pm, 2 pm and 5pm with a value of **4066447**, **4144741** and **3905744**,and the mean of the total day was **2667683.29**

In the day after the data usage peaked in 1 pm with a value of **4537161**,and the mean of the total day was **2668331.83**

**Paris clash of clans:**

A graph of a graph

Description automatically generated with medium confidenceA graph of blue lines

Description automatically generatedA graph of a graph

Description automatically generated with medium confidence

In the day before the update the data usage peaked in 1 to 2 pm with a value of **133131716** and **146031548**,and the mean of the total day was **102638270.13**

The day of the update the data usage peaked in 1pm, 2 pm with a value of **149815602**,and the mean of the total day was **104544180.54**

In the day after the data usage peaked in 2 pm with a value of 148427182, and the mean of the total day was **121006810.09**

**Dijon Fortnite:**

A graph of a number of blue bars

Description automatically generated with medium confidenceA graph of a number of blue vertical bars

Description automatically generated with medium confidenceA graph of a number of blue bars

Description automatically generated with medium confidence

In the day before the update the data usage peaked in 12 pm with a value of **1555876**, and the mean of the total day was **419536.09**

The day of the update the data usage peaked in 2 pm and 3pm with a value of **878899** and **822665**,and the mean of the total day was **457448.96**

In the day after the data usage peaked in 1am, 1 pm and 6pm with a value of **455195, 474881** and **509650**, and the mean of the total day was **210610.041**

**Paris Fortnite:**

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Description automatically generated with medium confidenceA graph of a number of blue bars

Description automatically generated with medium confidenceA graph of a number of blue bars

Description automatically generated with medium confidence

In the day before the update the data usage peaked in 6 pm and 7 pm with a value of **44438738** and **44845763**, and the mean of the total day was **19280580.17**

The day of the update the data usage peaked in 2 pm and 8pm with a value of **37433248**, and the mean of the total day was **16418104.67**

In the day after the data usage peaked in 11pm with a value of **34680206**,and the mean of the total day was **16966305.54**

**Analysis report on Fortnite data for Paris:**

A graph showing a number of traffic

Description automatically generated

We observe here the data of the popular free-to-play online game Fortnite, popular amongst young fans and players. The game hoarded the world of gaming and has topped the throne of online games for a good while. During 2019 which is the year we're analyzing for our data, the game has peaked at a mind-blowing 250 million players [1] worldwide making it one of the topmost-played games of that year alone. Our focus here is on the capital city of France for this game, and we're focused on the traffic around the release of the 9th season of the game. The 9th installment in this game was released on the 9th of May 2019, lasting till July 31st of the same year totaling 84 days. The theme of that newly released season then was new grounds for the game following a futuristic concept with key map changes that weren't very welcome by the player base, with replacing the all-time fan favorite hot spot "Tilted Towers" with "Neo Tilted" (often a hot spot is a POI on the map with higher rarity loot and has intense CQB potential). We've observed the players' traffic for the game starting from the 3rd of May, which was a Friday. The traffic approached a rise from approximately 367 million requests reaching the range of 420 million through the weekend. We continued observing towards the 6th of May which happened to be Monday, as expected, the traffic dropped to about 231 million which was expected due to the start of the working week and the absence of players especially young adults, as we need to bear in mind that 62.7% of the registered Fortnite players during 2022 where in the age category between 18 - 24 years[2]. The next significant change noticed was the 111.6% increase in the traffic towards the 8th reaching very close to 500 million traffic volume recorded on that day prior to the launch which took place around 10 AM CEST locally. common factors to such significant player rise are a phenomenon known as pre-release hype with interest in checking more details about the soon-to-be-released update. Following that, it was observed that the traffic dropped back to the 380 million requests regions, we could understand the possibility that the users are already engaged within the game without generating further traffic requests. Later, the levels of traffic requests stabilized within the normal levels, moving on within the season.

Given this information, we could draw some conclusions regarding game updates and their impact on the traffic volume of the users, with every release announced, players rush to collect any remaining rewards and exclusive items in the season's last days. With that, the traffic rises with many hyped up checking for patch notes and release time to be prepared to join in the battle first before everyone, such data would help us understand future major updates and how they would impact the entirety of the network, and the volume of traffic such updates causes and would help us realize the player's patterns to develop more capable infrastructure capable of scaling up to such requests to ensure seamless experience for everyone.

**Conclusion**

After the result that we have done in the dataset we can conclude that the data usage in Clash of Clans increased after the update, while Fortnite somehow stayed the same. Which means that Clash of Clans update brought a new and exciting feature in the table that Fortnite couldn’t do.

**Future Work**

do more analysis in many other updates.  
utilizing advanced predictive analytics and machine learning algorithms can improve the forecasting of traffic loads and potential network failures. Techniques such as deep learning, time series analysis, and anomaly detection can be explored to enhance prediction accuracy.

References

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[2] O. Samanta, "Fortnite Revenue, Player Count & Net Worth 2023," *Priori Data*, Aug. 19, 2023. https://prioridata.com/data/fortnite-statistics/

<https://www.ign.com/wikis/fortnite/Past_Updates_and_Patch_Notes>

<https://clashofclans.fandom.com/wiki/Version_History>