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Usage Analysis of Mobile Devices

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Abstract

Mobile phones have evolved from single-purpose communication devices into dynamic tools that support their users in a wide variety of tasks, e.g. playing games, listening to music, sightseeing, and navigating. In this way, the mobile phone has become increasingly analogous to a Swiss Army Knife. With a plan to analyze the mobile device usage among the students, an android application was created to collect both qualitative as well quantitative data for a period of time. Intent of this exercise was to learn trends among the students to better understand the current usage patterns. We adopt both quantitative and qualitative approaches in the analysis.

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1. Introduction

Mobile devices have become extremely important in the last few years but little public information exists on mobile application usage behavior. Today, there are more than 2.8 million apps available for the Android platform and 2.2 million for Apples iPhone.

Despite these large numbers, there is little public research available on application usage behavior. Very basic questions remain unanswered [1, 2, 3]. For instance, how long does each interaction with an app last? Does this vary by application category? If so, which categories inspire the longest interactions with their users? The data on contexts effect on application usage is equally sparse, leading to additional interesting questions. Which app user uses the most? How many apps a users generally uses per day? How many users are using the particular app on a particular day.

These data can be very useful to the Mobile Application Developers who will be able to think of great apps in the categories which are famous for the regular users and implement features that the users need in their app. This survey also helps in understanding where the current youth in an academic institutions spends his/her most of the time on the mobile device.

2. Method

We started by creating the application in Android Studio and choosing what data should we collect from the users. The collected data should be such that we get some promising statistics at the end of the project. We decided to collect foreground usage time for various apps in the users phone and the network used by the user. Also, we had to start a server to collect that data and save it to a database. So, we collected data in these three forms:

1. InstanceInfo (appID, state, profession, gender, age)
2. ForegroundTime (appID, packageName, foregroundTime)
3. HourlyData (appID, packageName, foregroundTime, network)

In the following subsections, we briefly describe the tools used, android application and the server side operation.

2.1. Tools Used

For the project, we have used a number of tools to complete it. They are as follows:

1. Android Studio [6] : Android Studio is the official integrated development environment (IDE) for the Android platform. We used it to create the application and a test android phone to test the app.
2. DigitalOcean [7] : DigitalOcean provides developers cloud services that help to deploy and scale applications that run simultaneously on multiple computers. We bought a server on this platform to install our server and host our api to receive the data over the internet.
3. Apache HTTP Server [8] : The Apache HTTP Server, colloquially called Apache, is the world's most used web server software. We used this to host the api to save data on the server. Also, we used it to host a web page to give a link to download the apk of the android application.
4. MySQL [9] : MySQL is an open-source relational database management system (RDBMS). We installed it on the server and used it to store the data in a tabular form. We created three tables namely, InstanceInfo, ForegroundTime and HourlyData to store the three types of data sent by the application.
5. PhpMyAdmin [10]: phpMyAdmin is a free and open source tool written in PHP intended to handle the administration of MySQL or MariaDB with the use of a web browser. We used it to access and monitor our data. Also, we used the sql queries in it to access the required data. It also helped us to generate the graphs in this report.
6. Python [11] : Python is a widely used high-level programming language for general-purpose programming, created by Guido van Rossum and first released in 1991. When we got data from the UsageStats, it had package name of the app and we needed the app category for some statistics. So, we used python to scrape data from the google play website to get the app category.

2.2. Android Application

On starting the app, it asks the user to fill some information about him like gender, state and profession. No private information is asked that he is unwilling to share to a unknown guy. Until, the user fills in the info, the user is unable to proceed with the application and no data is collected from the user. Once the user fills in the his information, it sends the data to the server to save. To display on the screen, the app collects foreground time of the applications used by the users for the last 24 hrs and display it on the screen. On clicking any element on the table, the app shows how many users have used the app in the last 6 hrs, 12 hrs and 24 hrs of time.

In background, the app securely sends the collected data to the server, at every hour after the time of filling in of the survey page. The data sent in JSON form which contains the data about the application used, their foreground time and the network the user was working on. This data is sent once every hour. Another data that was being sent by the phone was the same data but for an interval of a day and was sent once every day.

The application was made so that no information that the user is not willing to share with anyone is never collected by the application. To convince the users, we had to put up the full code of the application on a public platform, Github, so that the users can take a look if they ever doubt us.

The application, named 'AppUsageStats', is an application for Android version Marshmallow or above. The main feature of the app was to access the foreground time for other applications. To access this, we needed

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