Frequency of connection of people in open WI-FI networks in Ecuador

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1. INTRODUCTION

A lot of people use Internet everyday. Nowadays, everyone has at least one device to do basic tasks such as communicate, play games, listen music, watch videos, work and share everything in the cloud.

Over the years, companies launch modern devices to supply the needs and luxuries of people. This trend is growing and people like to have modern devices, even if they do not need them.

WI-FI networks have been growing over the years. Many parts of the country have had to update their network infrastructure due to the high demand for device connections and above all, maintaining QoS for people satisfaction.

2. RELATED WORK

A research has been made before about urban mobility in New York [1]. This explains usage patterns of people in WI-FI network. For example, the busiest hour of weekdays and weekends, classifications of devices by their manufacturer, based on their MAC Address which is unique for everyone of them.

3. DATA COLLECTION

Data has been collected from May 2015 to September 2016. The dataset has eight hundred thousand entries and contains information about the connections of devices to WI-FI spots around the city. Some of their owners, left their personal data as email, phone, names and date of birth.

During this period of time, the most relevant information about the connection is the MAC Address of the device (unique for everyone), the date and hour of the session, the operative system and browser where they go through the web.

A. User definition

We define the MAC Address of the device as a ***user***. However, at the beginning, the dataset does not contain the device manufacturer. We use an API [2] to get them. It uses the first three octets, commonly known as the *Organizationally Unique Identifier (OUI) [1].* Many companies manufacture a lot of devices with several OUIs, and exists a great similarity in some names of the manufacturers. For example, "Apple" and "Apple Inc.", into a great group called "Apple".

4. METHODOLOGY

We use *bounding box* to locate every connection in the correct place. It is useful, because it shows the quantity of connections from every place and the pattern in each period of the year.

Also, when we got the manufacturer of each device, we have manually grouped them in order to show which manufacturer is the most popular for the users and it can be useful to *predict* the economic status of the people. However, there are some outliers that may be considered non-significant for this research.

Furthermore, we have the operative system and we have grouped them with the connection hour of the user. It is useful to compliment the information of the manufacturers. Only *Apple and BlackBerry*, as manufacturers, have their own operating systems (iOS and BlackBerry OS respectively) for their devices. The others, use the most popular OS in mobile devices: **Android**.

5. RESULTS

After the processing of the dataset, it show us a lot useful results to understand the behavior of people when they are connected in the network.

One of them, is the number of connections that were made from May 2015 to September 2016. They have been grouped by month, in order to contrast the behavior of the people in specifics periods of the year, like Christmas and New Year's Eve.

The first picture shows a graph line where the x-axis shows the months of the year from May 2015 to September 2016 and the y-axis, the number of connections present on each month.

In this case, the majority of the connections have been made in August 2015 and May 2016. However, there are a lot of connections that do not have concordance with the period of the year like December and January. This tendency suggests that WI-FI spots were moved to another place, and as result of this, the number of connections decreased considerably.

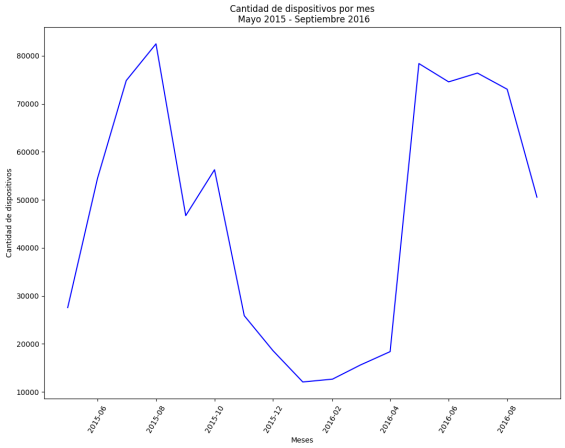

Fig. 1. Total connections per month.