

EXPLORING TWITTER USAGE ON MOBILE DEVICES IN BRAZIL

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Abstract

The main goal of this paper is to trace some considerations about Twitter usage on cell phones by Brazilian users of this microblogging service. For that purpose, we conducted a survey with a high number of Twitter users (802) about how they use Twitter on their mobile devices. Research results revealed that this technology is preferentially chosen by new and young Twitter users not necessarily with 3G technology on their cell phones.

Keywords

Internet, cyberculture, mobility, cell phones, Twitter

Introduction

Created on 2006, the initial proposal of Twitter was to be updated by users' cell phones through Short Message Service (SMS) messages. Back until 2007, Twitter even had a single international number to be used to send and receive updates by SMS. But costs were a bit high for people outside United States. The service was then discontinued for international users, and other forms for updating Twitter appeared, such as by web, applications, IM, and others.

Some years later, after successive changes, how are users updating information on Twitter? Do they use cell phones to send and receive information from Twitter? These questions are extremely relevant to the future of microblogging usage and this work, based on Twitter users' information collected via survey, attempts to address to them.

Mobile communication technologies are modifying communication patterns, which can lead to creative and unanticipated uses (Katz & Aakhus, 2002). In this sense, the aim of this research work is to investigate specifically how mobility in general, especially cell phones, are appropriated by Twitter users.

This paper is organized as follows: section 1 presents some discussions about general aspects related to microblogs and Twitter. In section 2, some information is presented about Internet accesses from cell phones, especially in Brazil, where we ran the survey, followed by considerations about mobility and cyberculture on section 3. Cyberculture and appropriation are discussed in section 4. After theoretical aspects, method used in this work is presented on section 5. Results and discussion are presented on section 6.

Microblogs and Twitter

Microblogs can be considered as "simplified blogs". The main difference between usual blogs and Twitter is that updates are limited in size (at Twitter, for example, each update can't exceed 140 characters). These short updates allow more portability for information. Due to this format versatility, microblogs can be updated through many different devices

such as cell phones, instant messengers and OS or mobile applications, and web. Besides having same basic features of a blog – such as reverse chronological display of updates, or content syndicated by Really Simple Syndication (RSS) –, microblogs have also two other characteristics: open architecture and mobility. Twitter's Application Programming Interface (API) is partially liberated, which allows developers to create derivative applications using data from Twitter (as in the creation of mashups, for example). Mobility is translated by the fact that Twitter can be updated and accessed from mobile devices, which allows usage for instant news and notifications. Recent research of Pew Research (December 2008) with North-American users of Twitter shows that these users tend to choose cell phones to: send more text messages, use more mobile Internet or read more news compared to ordinary people (Lenhart and Fox, 2009). One direct consequence is that these users are more susceptible to access Twitter from their cell phones.

About four years ago, microblogging tools have emerged on web and started to allow instant communication as well as a fast way for information diffusion. Different appropriations have been reported for tools like Twitter (<http://twitter.com>), Jaiku (<http://jaiku.com>) and Plurk (<http://plurk.com>) as the number of users increases, such as for conversations (Honeycutt & Herring, 2009; boyd et al., 2010), social networks (Huberman et al., 2009), political activism (Burns, 2009), and even for news distribution (Java et al., 2007; F. Silva, 2009). Although the main goal of microblogging services seems to be showing personal information (for instance, at Plurk, users are faced to an inspiring welcome sentence: "Tired of your existing Social Networks? Share your life easily with friends, family and fans"), in the course of time this type of tool has being increasingly used for other purposes (Mischaud, 2007). In fact, Twitter has changed the main question from "What are you doing?" to "What's going on?" in 2009. Consequentially its usage have been modified throughout the years to the point that it now may be considered more a news media rather than a social network (Kwak et al., 2010). Thus, just like blogs (Amaral et al., 2009; Bruns, 2005), microblogs can also be appropriated for the most diverse purposes (Java et al., 2007; Mischaud, 2007).

Twitter development is directly connected to its usage on cell phones. The choice for 140 characters as the limit for message publications (also called tweets) wasn't random. This number is related to the limit of digits for a SMS message on cell phones, which is of 160 characters. There's a safety margin of 20 characters for insertions as usernames, for example.

Even before Twitter popularization we could notice many situations regarding cell phone and Twitter usage that got media attention all over the world. One of these cases took place on April 2008, when a young man was released from jail with the aid of the microblogging service. Cairo's police in Egypt arrested him after shooting a photo of a political protest. After that, he posted through his cell phone, before having it apprehended, a message on Twitter consisted of only one word: "Arrested". It was enough for his friends to see the message, hire a lawyer, and manage to release him from jail (Simon, 2008).

Another example of mobile Twitter usage happened when Janis Krums was on his way to help the passengers from the plane that crashed on Hudson River on 15 January 2009, in New York. Before arriving at the scene, he took a picture of it using his cell phone and sent it straight to Twitter by posting it at TwitPic (<http://twitpic.com>). It was the first report on the subject, and soon his picture on Twitter received media attention (Terdiman, 2009).

Twitter is largely being used to send and receive updates through mobile devices such as cell phones. This allows appropriations such as for mobile citizen journalism, since it is possible to report from an event directly from where it is taking place (F. Silva, 2008).

The possibility of publishing a message on Twitter from cell phones offers the power of immediacy and pulverization to users. These users can tweet recent information on a website where lots of people are connected. Next sections will discuss this technology and its impacts on how people use it.

Internet on mobile phones

Even decades ago, messages could already be sent from a distant point to another (Katz and Aakhus, 2002). Telegraph, phone, mobile phone and even radiotelephony already allowed this procedure. The cellular phone has been invented in 1947, by Bell Labs in the United States, but only in 1984 the system that allows its utilization began to be implemented in America (Pirotti and Zuccolotto, 2009). In constant evolution, cell phones in Brazil are an extremely popular consuming product. Recent research performed by Cetic (Cetic, 2009) identified that: 78 percent of Brazilian residences have, at least, one cell phone and that 54 percent of them have a computer.

Internet usage on mobile phones is a widely known procedure and is becoming a very common fact between people that have them. With the appearance of third generation networks (3G) and increasing popularization of smartphones, new motivations and goals related to Internet usage also appeared.

Some technologies are available in order to access Internet from cell phones. Wi-Fi, or Wireless Fidelity, is a term used by the Wireless Ethernet Compatibility Alliance to describe wireless networking technology which access is provided from a connection to a router. Not all cell phones provide Internet access using this technology. 3G is a technology that allows Internet access from the third generation of mobile services. It allows a connection with speeds of up to 2Mbps, and is provided by the cell phone operator. Coverage tends to be more limited than EDGE. This technology is usually present in smartphones. EDGE, or Enhanced Data rates for GSM Evolution, is a technology that allows Internet access on cell phones with GSM technology. It allows speeds of up to 385Kbps, and its coverage tends to be larger than 3G. SMS, or Short Message Service, for instance, is a technology present in almost all GSM cell phones which allows data exchange between cell phones by text messages with up to 160 characters. Although SMS is not a way to access Internet itself, it may be possible to be used to exchange messages between a cell phone and a computer.

In spite of many Brazilians owning cell phones, its usage for Internet is still derisive. Nevertheless, accessing Internet from cell phones is a widely diffused practice proportionally to user's purchasing power. According to Cetic (Cetic, 2009), only two percent of analyzed families, with income up to one minimum wage, stated using Internet on the cell phone. Although cell phones are widely used all over the world, on Latin-American context this situation tends to be a little different. The main causes are cost and technology limitations (Brazil has one of the world's most expensive mobile phone rates) (S. Silva, 2010). Even though not largely used, this usage can be situated on a broader context of cyberculture.

Mobility and Cyberculture

Mobile devices usage for information and communication data exchange is an actual tendency. This tendency is based on technological progress that allows the integration between Internet and many devices. Mobile communication and pervasive technologies (that are technologies characterized by chip presence on equipments that start to change information between them (Lemos & Valentim, 2007)) start changing the way people meet themselves, work, fight, sell, govern and create (Rheingold, 2002). Rheingold (2002) suggested that mobile Internet will not be a new manner to do old things with mobility but will be a new way to do different things that could not be done before.

By using this new available communication and information tool, people can have access to another individuals and companies from anywhere, at any time, on a way never thought before.

This connectivity possibility, when generalized, generates ubiquity feeling, which means, the feeling of being able to stay simultaneously in more than one place at a time (Santaella, 2007). With ubiquity desire satisfied, mobile Internet utilization inducts new ways of information consumption and sociability, leading to the appearance of a new culture (Lemos & Valentim, 2007).

This new culture is called cyberculture and has had three fundamental stages according to Lemos (2004). At first, in the 70's, technological center was the personal computer. The second stage (80's and 90's) is characterized by Internet popularization that turned personal computer into a public computer. Nowadays (on 21th century), the third stage's technological center is the mobile public computer that is inserted in the so-called connection age. This last stage is characterized by ubiquitous and pervasive computation continuing the public production of previous stage (like blogs and forums) but on a mobile form.

In this case Internet changes into a generalized connection environment. This environment gives to technological mobile devices a special status. One of the most used devices that meet these requirements is the cell phone. Last developed cell phones can be classified as "*teletudo*" (something like "teleeverything"), that means, a cell phone that has multiple functions (Lemos, 2004).

Cell phones connected to mobile Internet allows its usage in displacement, restricted to areas that receive call signal but not to a unique place. The introduction of the telephone changed people's life, but mobility brought by the cell phones together with social interactions and computer-mediated communication changed even more (Katz & Aakhus, 2002).

Cyberspace is affected by the possibility of accessing Internet from cell phones because it is not necessary to be on determinate physical place to: (i) be connected, (ii) access determinate content and (iii) interact to other individuals. Many sites and applications are being developed in order to exploit this potentiality, as on mobile social networks and games. These applications use information as individual geo-localization that is provided by cell phone as additional resources for sites. Two concepts are very important and have a direct impact on cyberspace: cyberculture and appropriation.

Cyberculture and appropriation

Appropriation is a typical aspect of the cyberculture environment. Users tend to use the tools not only on the way they are specified by the manufacturers, but also into unimagined or inventive ways. SMS messages, for example, were created for short data exchange between cell phones. Its users, however, appropriated it for several other purposes, as for organizing smart mobs (Rheingold, 2002), control robots (Manojkumar et al., 2010) or getting aid after tragedies in difficult access places, as it happened on the 2004 tsunami on Asia (Lemos & Novas, 2006).

Appropriation is understood in this work the same way it is in Lemos (2002). This concept is based on Perriault and his sociology of uses, as the creative ways adopted by Internet users, often very diverse from the original purpose of the systems in a context of cyberculture. While adopting a new technology involves simply its usage and tool consumption, appropriation is a creative process where limits and possibilities are tested aiming to adapt the new technology to individual social life and culture (S. Silva, 2010). Twitter mobile appropriations, in this sense, would be the forms by which the microblogging tool is used and adapted by users through mobile access, as in using cell phones to update and receive updates from Twitter.

To get necessary data for this work, there are many possible methods and the chosen method is presented in the next section followed by results and conclusions of development.

Development method

After a deep analysis of the theoretical information presented in the previous sections, some questions appeared: (i) In practice, how is Twitter used through cell phones? (ii) Are there different possible uses for it? (iii) Does 3G technology affects Twitter usage on cell phones?

One way to answer these questions is asking them to people that use Twitter. The idea was to get many answers as possible for a general mapping of this area since it is difficult to find specific material about it. A great procedure to get a lot of answers was to apply a survey available online. In order to limit the scope of this research paper, authors chose to restrict the survey to Brazilian users of Twitter. The authors believe that appropriation is a culturally located phenomenon, which is why it made sense to restrict the survey to users from a single country. According to a report by Sysomos, Brazilian users are the second larger geographical group on Twitter (Sysomos, 2010). Also, recent data from comScore shows that Twitter penetration among Brazilian users of the tool is extremely high (20.5 percent of Brazilian Internet users use the tool). Nonetheless, the country is not listed on the same report on results regarding mobile access (comScore, 2010).

Following this line, the survey was created with Google Forms tool (Google, 2010) and its link was released through blogs and Twitter between 6 and 19 April 2010. Questions were addressed in Portuguese. There were a great number of answers in the first three days and after that the number remained constant but reduced. After closing the survey, the number of answers was 802. The result was a non-probabilistic random sample by convenience.

It's important to say that respondents are part of a specific group of users often connected to Twitter. But this specific group have different types of users and uses. Everybody that had access to survey link could answer it, either by finding it on one of the author's Twitter profile, or by finding it from one of the many people that helped spreading the word about it by retweeting the link.

There were objective, of single and multiple choice, and discursive questions chosen based on authors experience with Twitter usage from cell phones. Initially, questions seemed to cover all topics needed by authors but, by compiling data, it was noticed that some non-covered topics were also important and they are discussed on conclusions section. The possible choices of objective questions were chosen empirically.

To relate the answers given for chosen questions and conclude something about them, some statistical methods should be applied on collected data. Correlation and determination coefficients can give the direct or reverse relation between two variables and the quantitative measurement of this relation (Cohen et al., 2003).

The most common method to measure dependency between two variables is the correlation coefficient. This coefficient is obtained by dividing covariance by the product of standard deviation of two variables. One way of getting this coefficient is using Equation 1.

$$r_{x,y} = \frac{\frac{X.Y - X * Y}{n}}{\sqrt{X^2 - \frac{(X)^2}{n} * Y^2 - \frac{(Y)^2}{n}}} \quad (1)$$

Equation 1 has X and Y as the two series of variables and n as the number of samples. When this coefficient achieves value of $+1$, is a perfect positive correlation or increasing linear relationship. Value of -1 is perfect negative correlation but in this case is a decreasing linear relationship between two variables. If variables are independent, correlation coefficient is 0 . After calculating correlation coefficient, to know how percentage of Y values explains X values behavior is simple. Correlation coefficient squared is called determination coefficient and gives exactly this desired percentage. Correlation between X and Y has the same value of correlation between Y and X . Applying this method the results of the survey could be analyzed correctly searching for relevant information.

Results and discussion

Data collected from applied survey is presented in following paragraphs. There are some interesting characteristics about Twitter users analyzed after each table. Altogether 26 questions were made available to users but only some of them are analyzed in this work. Also, some questions didn't have answers from everyone.

First interesting information is that 58 percent of respondents are from Brazil's southeast region with 34 percent from São Paulo state. According to Table 1, 47 percent of them are between 18 and 25 years old. Few new users answered this survey. Table 2 shows that older users of the tool predominate in the sample, 83 percent of respondents use Twitter for more than six months with 23 percent using it for more than two years.

Table 1. How old are you?

Age	#	%
Less than 18 years	65	8%
from 18 to 25 years	37 4	47%
from 26 to 30 years	17 3	22%
from 31 to 40 years	14 3	18%
from 41 to 50 years	34	4%
from 51 to 60 years	9	1%
More than 61 years	2	0%
Total	80 0	100 %

Table 2. For how long do you use Twitter?

Time	#	%
Less than a month	36	5%
From one to six months	10 0	12%
From six months to one year	21 1	26%
From one to two years	27 1	34%
From two to three years	13 6	17%
More than three years	48	6%
Total	80 2	100 %

Tables 3 and 4 presents number of followers and following users. People tended to have less than 500 followers (81 percent) and to follow less than 500 users (90 percent).

Table 3. Followers

Total Followers	#	%
More than 100.	314	39%
Between 101 and 500.	336	42%
Between 501 and 1000.	75	9%
Between 1001 and 5000.	68	8%
More than 5001.	9	1%
Total	802	100%

Table 4. Following

Total Following	#	%
More than 100.	312	39%
Between 101 and 500.	409	51%
Between 501 and 1000.	50	6%
Between 1001 and 5000.	28	3%
More than 5001.	3	< 1%
Total	802	100%

Twitter profiles can be public or private, 93 percent of users that answered the survey have public profiles (Figure 1). A public profile allows everyone to see published messages without previous authorization.

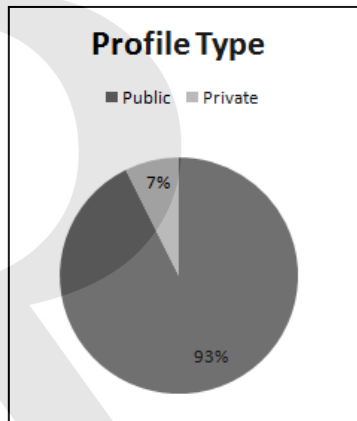


Figure 1. Profile Types

Table 5. Do you use to access Twitter from your cell phone?

Frequency	#	%
Never	21 9	27%
Rarely	80	10%
Sometimes	19 2	24%
Almost Always	12 4	15%
Always	18 7	23%
Total	80 2	100 %

Table 5 shows that people have different habits about accessing Twitter from the cell phone. While 27 percent reported never access Twitter this way, 23 percent affirmed that always use this technology.

One of the discursive questions asked why not access Twitter from cell phone, aimed specifically at those 219 users that reported never using Twitter from a cell phone. The main reasons presented are: (i) not having applications that allow this access (101 answers), (ii) lack of knowledge about how to do this access (25), (iii) the high cost of accessing the

Internet from the cell phone (22) and (iv) prepaid phones (18). Seventy-three percent of them answered yes when the question was about intention to use Twitter from cell phone in the future.

How users access Twitter from their cell phones? (Figure 2) This question is very important for this work and has two possible answers: (i) regarding access technology or (ii) regarding application used for this access. Most used access technologies are Wi-Fi (43 percent) or 3G (37 percent), 19 percent use EDGE connection. Forty-two percent have a special software to access Twitter while 34 percent access it by mobile browsers and 40 percent update it using SMS.

Table 6 shows the results of another important question for this work's proposal. Fifty-eight percent of respondents have 3G technology but only 44 percent of them use this technology to access Twitter. Table 7 shows that more than 90 percent of cell phone users of Twitter use it to send messages, and 66 percent use it to receive updates. The difference between people that use to send and to receive was expected to be bigger due to mobile Internet costs. Since June 2010 TIM offers an official number for sending Twitter updates by SMS in Brazil (G1, 2010). But by the time we applied the questionnaire, Twitter still didn't have an official number for SMS updates in the country.

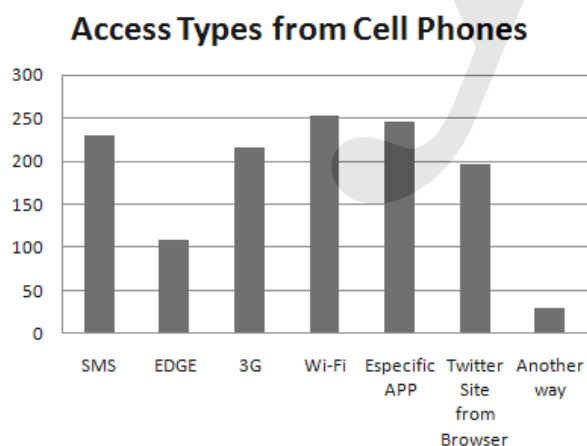


Figure 2. Access Types from Cell Phones

Table 6. Does your cell phone have 3G technology? Do you use it to access Twitter?

3G Technology	#	%
My cell phone has / Use for Twitter	253	44%
My cell phone has / Do not use for Twitter	79	14%
My cell phone doesn't have / Would use for Twitter	226	39%
My cell phone doesn't have / Would not use for Twitter	21	4%
Total	579	100%

So it made sense to ask if users had a specific plan from their cell phone operators in order to access Twitter on their cell phones.

Only 85 users, or 14 percent of the respondents that reported using Twitter on cell phones, said that they had subscribed to a specific plan from their cell phone operators in order to send or receive updates from Twitter.

Table 7. Purposes of cell phone Twitter utilization.

Purposes	#	%
Send updates	195	34%
Receive updates	46	8%
Both	337	58%
Total	578	100%

These 85 users were asked to provide details about their plans. The most cited plan was Vivo “*Twittando*”, from Vivo cell phone operator, which allows sending and receiving Twitter updates using SMS technology. Forty percent of these 85 respondents declared that they not only are able to send but also can receive Twitter updates by SMS. Since they have

to pay for every SMS they receive, the majority of these users reported that only receives messages that mentions their usernames (replies) or direct messages.

All respondents that reported using Twitter on cell phone were invited to relate, on a discursive question, what situations inducted them to send updates to Twitter from a cell phone. Among those users, 13.7 percent use Twitter from cell phones the same way they use on their computers, 18.1 percent use cell phones only when there is no computer near them. Cell phones are used to access Twitter while users are waiting something for 1.3 percent and to say where they are for other 1.3 percent. Two percent access mobile Internet to send messages for Twitter when there is no Wi-Fi connection available, and 0.04 percent when there's no electric energy. Only 3.5 percent use Twitter when are travelling, 8.6 percent use it to do live coverage of events, 10.44 percent use on traffic. Worrying about bring useful information to users appeared on 0.06 percent of the answers, 12.72 percent only use for facts that are important to them. Other specific uses for Twitter from cell phones are interesting: (i) 0.47 percent use for replies, (ii) 1.3 percent for retweets, (iii) 4.8 percent use for posting tweets with photos, (iv) 2.6 percent report using on laziness situations and (v) 0.32 percent use when they are too lazy to turn on the computer.

After analyzing the results, some answers were correlated to know if they are statistically linked. Table 5 answers were correlated to tables 1,2,3,4 and 6 answers. To make this analysis possible, options were quantified on a crescent order, for example: on questions that asked for ages, lower ages received lower numbers and higher ages received higher numbers. Non-answered questions received 0 because correlation formula is a group of sums and this is a neutral value. Figure 3 presents rounded coefficient values.

Statistical analysis of these variables showed that: (i) the older users (related to age) are the less that accesses Twitter, (ii) new Twitter users (related to time usage) access Twitter from cell phone more frequently than older users, (iii) as a direct consequence of (ii) the more followers and following the less cell phone accesses, and the most interesting relation (v) the fact that cell phone has 3G technology does not mean that people access Twitter more

from their cell phones. All this conclusions were based on coefficient values. There are no perfect relations between variables but these conclusions are real tendencies.

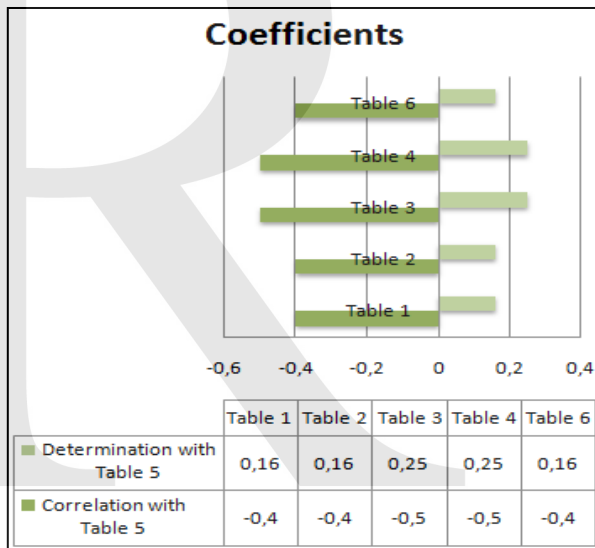


Figure 3. Coefficients

Conclusions

Although the use of Twitter from cell phone seems to be uncommon among respondents, it is interesting to notice that many different uses for Twitter through mobile devices were found. While most users choose Wi-Fi to access Twitter from cell phones, SMS users are a high number (40 percent) and draws attention. This result is due to the fact that few cell phones have 3G and Wi-Fi technology forcing users that want to use Twitter this way to spend a little more and choose SMS as an alternative.

It's interesting to notice that this tool is largely used to send updates from mobile devices. This fact allows users to announce facts recently happened. Survey answers also show that Brazilian users do not largely use Twitter from their cell phones because of technological and financial limitations. However, a large amount of those that doesn't yet use Twitter through cell phones (73 percent) is willing to use it in the future, which can be seen as a positive perspective to mobile access of Twitter.

The main goal of this work was achieved and information contained in this document is very important to future studies of microblogs. Data from other countries can be retrieved in order to compare Twitter usage from mobile phones in different regions.

As future works, other questions not mentioned in this work can be analyzed and correlated to find other relations between them. After this survey, some questions showed to be not what authors were expecting so they had to be reformulated and some interviews can be done with a fewer number of users but in a more profound way in order to explore these questions further. A higher number of answers is also necessary to verify if this statistical relations between variables will tend to perfect relations or to independent relations.

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