

SOCIAL NETWORKS: GENERATOR OF PERFORMANCE TEST AND MEASUREMENT OF BIG DATA PUBLICATIONS' INFLUENCE

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ABSTRACT

This contribution consists in proposing a system allowing generating the performance tests on publications diffused in social networks by means of an automatic extraction of engagement data through the KPI (Key Performance Indicator) of social networks analysis. Our solution also collects all information related to individual behavior and posts that are published on social network sites, especially the number, nature and type of posts that are shared daily. This proposed system has three functions: first, it allows the extraction of data in an automatic way which will allow an ease of collecting a large number of data which arrives to Big Data; secondly, it helps all user, through indicators that will be generate, to analyze data and test the performance and influence of publications; and thirdly, it presents in the business intelligence aspect, all results and some comments with recommendations for better dissemination of publications, at the right time and with the right people.

Keywords: *Social Networks; KPI; SMA;SNA; Performance; Publication*

1. INTRODUCTION

Today, what distinguishes the current era is the enormous evolution and progress in information and communications technologies (ICT) in particular social networking sites on various types and forms, these sites have become an achievement made by giant and creative thoughts, thanks to sophisticated technologies, apart from the fact that these new communication processes have eminent positive and negative effects and impacts. Social networks or social network sites are one of online communities that include a wide range of social media such as: Facebook, Twitter, Instagram, LinkedIn, Youtube and others, which in turn gives the ability to create personal accounts, in addition to exchanging ideas and opinions and also communicating with other like-minded people [11][12].

Social network analysis (SNA) is one of recent research areas, its power lies in the fact that there is a mass of exchanging data circulated on the Internet, currently, we are talking about almost a third of people around the world have an account on social networks, including two billion on Facebook which is the most visited social networking site in the world according to Alexa [2], that said, we are talking about thousands of data streams generated

on the internet which amply forms the Big Data concept.

The main objectives of social network analysis are to understand the behavior of users on social networks; to know when they connect; what they say; what they share; what they like the most; and for a better distribution of publications at the right time with the right people. In addition, when we talk about social media, two subdomains that are omnipresent: social media monitoring, which concerns strategic or competitive intelligence; and social media engagement, which concerns all kinds of engagement compared to publications shared and interactions of their communities based on the conversations generated.

Some academics have verified in what way Facebook is involved to different facets of the student knowledge counting learning [17][27][28][29][33], student engagement [34] multitasking [19][30], political activity [35], political participation [21], development of identity and peer relationships [22], and relationship building and maintenance [23], security [24], behaviors study [25], optimization and influence diffusion [18][20] and many other fields. Furthermore, researchers have tested how Facebook use relates to personality variables such as scores on big five personality scope; honesty, meticulousness,

extraversion, friendliness, and neuroticism [26][31][32], and some approach to analyze user-generated comments from social media like [36].

In order to understand the users behavior and check the reliability of publications on social networks, we present in this paper the functioning and general architecture of our new SMPTEG System (Social Media Performance TEst Generator) which is based on KPIs (Key Performance Indicator) to generate, on the one hand, all data of social media monitoring to group and analyze interpretations and, on the other hand, to generate those of social media engagement in order to group and understand discussion and interaction of users.

In this paper, we present social networks in section 2, after that, we will talk about SNA field in section 3, we present the modeling and the functioning of our SMPTEG system in section 4, and we will conclude this paper in section 5.

2. SOCIAL NETWORKS

Social networks field is a fertile topic in the scientific research subjects, where it is studied by all researchers from various aspects and in various fields like sociology, law, linguistic and communication, as well as in technical aspects such as informatics and other Scientific fields. In this section, we will try to define these social networks, their concept and their impact on individual and society.

Since the emergence of web 2.0 version in 2004 which was called participatory web or social web [13]. This is an update of the web characterized by more simplicity and allows interaction between users to contribute and exchange information with a simple way through content and pages structure, so to create social interaction which makes user an active online person. Therefore, the internet has become crowded with new websites generation, called social media. In addition, internet users are now able to control all the uses of web, its tools and functions, which enabled them to easily contribute to information and interaction exchange (discussion, sharing, etc..) to all online publications.

Social networks or social media, cover various activities that integrate technology, social interaction (between individuals or community) and content creation, where they are currently used almost everywhere (at home, school, or work) and through any devices (computer, smartphone or tablet). Social networks are a collection of online applications (blogs, microblogging, sharing sites, social media, etc.) that are based on web 2.0

technology concept. This kind of web has allowed building different types of large-scale social networks, which are now known as an important means of disseminating information and communication between individuals themselves and between individuals and institutions [14].

The goals of social networking sites differ each other, where they are often classified into three sites: personal sites, like Facebook and twitter; entertainment sites that allow to publish photos and videos, like Instagram and YouTube; and professional social sites like LinkedIn that allow users, on the one hand, to create a community for exchanging knowledges and experiences and, on the other hand, to find better opportunities for their future professional careers.

The impressive growth of social media subscribers is alarming, for example Facebook which has grown in just five years from 14083 to more than 800 million users, and now nearly two billion active subscribers[15][16]. So, we can say that these numbers show how far social networks are implanted in our lifestyle, and therefore, we should be able to understand and evaluate the influence and impact of these sites.

When we talk about social networking sites, it is necessary to shed light on the most influential sites in the world, perhaps impact is relatively depending on the places or regions through which those sites can be visited. Here, it must be recalled, for example, that Facebook, despite being ranked fourth as the most visited web site in the world and in first rank as the most visited social web site in the world (according to Alexa)[2], it is prohibited in the major countries such as Russia and China or the countries that have a tense relationship with the United States (as original country of Facebook) like Iran, therefore, it is not possible to study its impact on society of those countries, so, the impact is limited only to state that allows its citizens to use this social networking site. However, the countries that we are talking about, they are have some social networking sites that are used by their citizens and may be used from another country if there is no sovereign decision prohibiting them. In addition, social networks can also define the different relationships that bind individuals to each other and the manner in which these different relationships are organized, they make it possible to understand individuals behavior, and may therefore represented by a well-defined structure or dynamic form of a social group, in which the user creates social "fans", "followers", "friends", or "contacts" according to shared interests.

In addition, social media has many benefits, for example to the company by boosting their brand and understanding customer behavior; and for people's emotional health, such as getting to know new friends, linking friendship as well as exchanging opinions, exchanging knowledge and helping people. These sites allow people to share their thoughts, opinions, and feelings with others, and they allows them to talk about what is important to them, and it is easy through these means, to spread, share and promote values, knowledge and exchange information, so, to help, influence others and persuade them to make a difference in their lives and lead them, all of that it could be analyze through social media analytics (SMA).

3. SOCIAL MEDIA ANALYTICS (SMA)

3.1. Key Performance Indicator

The social media analytics (SMA) is defined as the art and science of extracting valuable hidden insights from vast amounts of semi-structured and unstructured social media data to enable informed and insightful decision making [1]. Social network analysis is an advanced analysis that specifically focuses on identifying and predicting connections, relationships and influence between individuals and groups. It uses transactions, interactions and other behavioral information that may come from social media. The main objectives of SMA are knowing how to analyze the right data, which is data that have an impact on the organization's products, services or marketing objectives, in order to attract the attention of target customers and be able to generate engagement, so to increase revenue and earnings. In SMA field as Marketing fields there are an associated metric which is called KPI (Key Performance Indicator). This metric is the data that we will be analyzed as being values of the success or failure of the individual or organization. In the case of social networks, KPIs can represent the number of likes, number of fans or followers, number of clicks, number of reaches, number of sharing, etc. For example, in order to "make the buzz", its KPIs are: retweets, shares, or tags, etc. In order to "improve reputation", its KPIs are: like, reactions, or feeling, etc. In order to "get feedback", its KPIs are: comment, engagement, reviews, or reply, etc.

Generally, the data analysis in SMA, can be either quantitative which is based on information relating to the engagement (number of "likes", "clicks", or "followers" etc.) which the data may be

represented as sum or percentage form, this is a set of statistics subject offered by some social networks such as Facebook Statistics for Facebook and Twitter Analytics for Twitter; either qualitative based on feelings analysis related to the content produced (for example: comments.). This feelings analysis aspect is necessary and present today, in a lot of social network analysis tools, which is allow to extract a textual content representing an opinion around a product or service. It is, moreover, this type of analysis and techniques that most distinguishes current tools from each other; Understanding the analysis data and how it is classified is a decisive objective in order to present a clear, precise analysis work with fewer errors.

Like sentiment analysis, text analysis or tags or online conversations are an important analysis to be always up to date and attentive to everybody talking about you, your organization, your services or your products, to react at the right time and in order to keep customers informed of the right information proactively; to influence the marketing and content strategy; and to reestablish trust between the consumers. There are many tools like this analysis, Google Alert [37] is a good example, on the one hand, because it is free and, on the other hand, because it is easy to use. In fact, in terms of operation, once the configuration of Google Alert is established, the person concerned will be received an email each time once a new publication circulates on the internet bearing the desired keyword (s) provided to the system in configuration step.

3.2. Latest technologies and issues

Tools and technologies in Social Network Analysis make it possible to extract a large amount of data that have an impact on individuals or organization, in this topic, two aspects are considered necessary to understand those tools and technologies. First, it means understanding how data is collected and classified? What data is affected? How can we access this data? is that via free tools like Google or via APIs offered by some social networking sites or other? and make difference between data archived and real-time data. Second, is to understand how data is analyzed? What methodologies help to perform analysis? What type of analysis do we want? for example in qualitative analysis, we find the text analysis which we can perform a binary analysis between positive and negative things to make a good judgment (e.g. often when a text contains some words like "not", "isn't", "aren't", "doesn't" or "don't" etc., it means that the text is negative). To

make good decisions, we can use Machine Learning which will allow us to teach the tool what we want (e.g. teach the tool what is negative) while preparing Dataset. We also find Natural Language Processing NLP as advanced technologies to analyze language in a natural way and in its context. Table 1 presents all the concepts and technologies involved in SMA field.

Table 1: Concepts and technologies involved in SMA

Concept Name	Nature of intervention
Machine Learning	Generally, a human can analyze a series of words and sentences and learn to a machine to do it by processing a large number of opinions with a qualitative analysis [4][5][6]. The advantage of machine learning, lies that the initial contribution or what we say "input" is made by humans, so it is a precise and correct contribution. In contrast, the disadvantage of this technique will undoubtedly be the result (output), since this result comes from the machine, so it may not always be adequate.
Natural Language Processing	Automatic natural language processing [3] is an advanced multidisciplinary field in sentiment analysis involving linguistics. One of its major objectives, we find the processing of a huge number of text-type collections to analyze the content. However, this technology is a sub-class of the artificial intelligence, computing, linguistic computing and industry, so it requires a lot of resources that we cannot master in a single stroke.
Social Media Monitoring	It is the use of tools to calculate the popularity of a brand, individual or organization by extracting social networks data [7] [8] [9]. In brand case, we talk about: Business intelligence that used to find out what is said about our service or brand; and competitive intelligence to find out what is said about our competitors. This technique allows researchers to have a global visibility of social media, measure the impact, identify engagement opportunities, assess competitor activity and other.
Social Media Engagement	We talk about all kinds of interactions and feedback initiated by individuals or organization, in order

	to provide replies or help. Social media engagement measures all shares, likes and comments, and other. from subscribers or public people. It has always been a common measure to assess the performance of social media in order to find effective solutions for building relationships that can generate conversions and therefore profits.
Business Intelligence	Social media analytics uses Business Intelligence techniques to collect, consolidate, model and restore data through reports, dashboards, visualization, event-based alerts, text mining, etc. In order to apply them to information gathered by social media such as Facebook, Twitter, Instagram and others.
Big Data	Qualitative analysis data and quantitative analysis data can give us good results if data processed are in mass, this imposes the need to benefit from Big Data techniques. The quantitative fragmentation of data and especially which it comes from social media flow has forced researchers to look for new methods of visualization and analysis; it is a question of discovering new instructions concerning research, storage, analysis and presentation of data.

3.3. Tools and Limits

Generally, in social networks, we talk about content creation which is considered as one of the effective ways to be appreciated and noticed, but sometimes we can find ourselves in situations facing short of the idea or we can neither write nor be inspired. Content creation is essentially based on topics and subjects that a community likes to follow and imagine relevant solutions and bring news and all information that can satisfy followers. Today there are dozens of tools on the web to detect what interests follow and know which accounts share the same interests, for example, Twitter statistics, that facilitate to see the interest of your followers, and create and distribute content based on their interest. There are also Google Trend as a tool allowing to know the frequency with which a term was typed and to identify the trend themes which are bounced according to what is happening in real time. In general, as a limit, Google Trends allows to search by keywords, but for all those (keywords) with low usage and which are not accessible in regional level

are automatically excluded. In addition, to compare Google search queries with each other, the comparison allowed is limited to just five one. Statistic Facebook is also an important tool for analysis, but its limit lies that it does not give enough information on the pages for competitors, especially since we are talking about competitive strategy. In general, for other analysis tools, its limits are about the price because the majority are not free.

4. SOCIAL MEDIA PERFORMANCE TEST GENERATOR - SMPTEG

We propose in this paper the SMPTEG System (Social Media Performance Test Generator) that helps all users to generating performance test and providing all data to simplify analysis in order to know where we are and what we will do to give the appropriate decision.

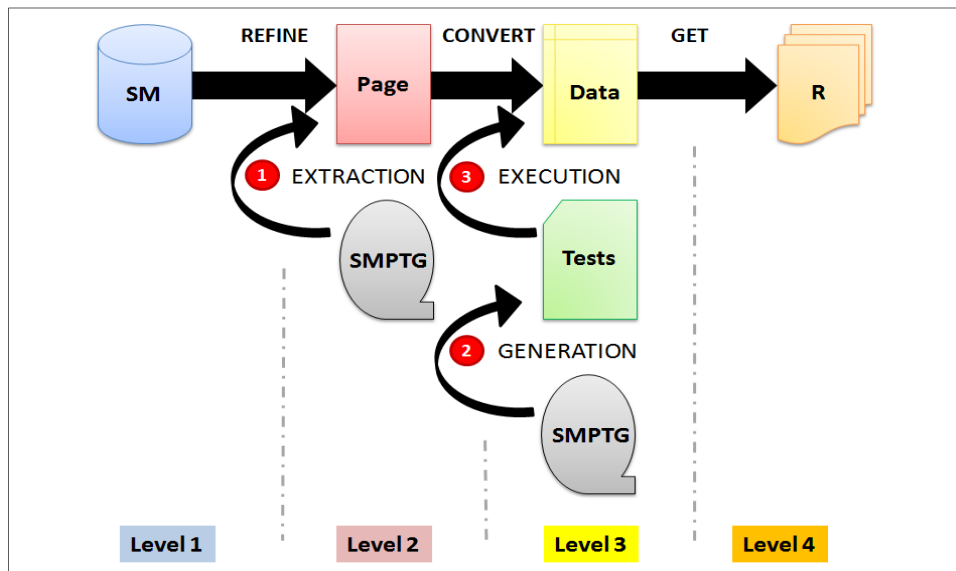


Figure 1: Functioning And General Architecture Of SMPTEG System

We present in this paragraph, the functioning and general architecture of our SMPTEG system which has triple vocation: automatic data extraction; data analysis; and display outlines with recommendations.

As shown in Figure 1, the process of functioning of our system is divided into 4 levels:

Level 1: This is the first step, to connect into media social for having the necessary privileges to show all pages we want to analyze and parse.

Level 2: The aim of this level, firstly, is to refine and choose the desired social network page, and secondly, just after choosing the right page, there will be the intervention of SMPTEG (1) in order to extract the necessary information which helps to analyze the page. Table 2 shows all information to be extracted which represents the key performance indicators - KPIs (each indicator is characterized by a unique code into our system). Once the extraction operation completes successfully, we go up to the next level.

Table2: List of Key Performance Indicators managed by SMPTEG

Code	Title	Type	Analysis type	Meaning and significance
CK01	Clicks	Number	Quantitative	Clicks on links reflect the importance of publication.
LI01	Likes	Number	Quantitative	Likes on a post means that it deserves a higher place in the search results
SR01	Shares	Number	Quantitative	Sharing is a recommendation to review a post and therefore it is an good indicator of the importance of the post.
CT01	Comments	Text	Qualitative	Comments can be praise, criticism or discussion and they are all useful for qualitative analysis.
MN01	Mentions	Text	Qualitative	Mentions or tags allow easy grouping of all kinds of

				information.
RH01	Reach	Number	Quantitative	Reach represents the total number of people who saw a given publication
FR01	Followers	Number	Quantitative	Followers or fans represents the total number of people who follow an individual or organization.
FR02	Active Followers	Number	Quantitative	The number of followers who have logged in and interacted with a specific post in a given period.

Level 3: This is the main level, it is concerning data analysis, in this level after extracting the necessary data, there will be two interesting operations; operation (2) which allows the generation of test sets from what we had as a result of level 2, and operation (3) which will allow the execution of tests on the data which is converted after level 2 operations.

Level 4: This level represents the outline of the final result with all analysis diagrams helping to make a decision. All details of this level will be the subject of our future work by highlighting all the functionalities available on the SMPTEG system.

In general, this system with its life cycle see Figure 2, allows at first attempt the extraction of

data in an automatic way which will allow the ease of collection of a large number of data, may arrive to Big Data (**Level2**), secondly, it helps its users, through the indicators they generate (**operation (2)**) to analyze data for testing the performance and influence of publications (**operation (3)**)(**Level3**), and finally, it shows in its part of business intelligence, the outline and results which propose a set of recommendations for a better diffusion and dissemination of information, at the right time and with right people (**Level4**).

The aim of this study is not just to present our system by also to highlight the importance of all kind of data diffused in social network.

Table 3: Comparative table of manual method and automatic method (SMPTEG)

Steps	Manual method	Automatic method (SMPTEG)
Collect (import html code)	Using Copy / Paste	Click on Button
Sorting and filtering (groups together essential elements)	More than 10 minutes for 10 publications	Less than 1 second for 100 publications
Generation of analysis diagrams	On Spreadsheet Software with a lot of time	On SMPTEG with less time.
Performance test results	N/A	New option

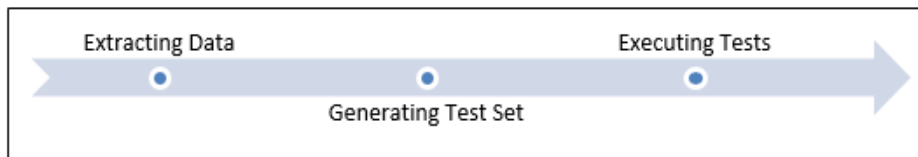


Figure2: Lifecycle of SMPTEG system operations

Table 2, presents a comparison of certain steps between doing the analysis with using the manual method that we opted for the study [10], and using the automatic method by SMPTEG system which we have just present in this paper. Collecting html code is a step that has already done in the previous work (manual method) it is almost the same thing in terms of time; but in the manual way we use copy/paste, but we click on a button in the automatic way. Regarding the sorting and filtering and grouping of essential HTML elements for analysis can take a lot of time using the manual method which consists in reviewing each line of the HTML code and taking the necessary information,

while the automatic method with SMPTEG, we can just click on a button to do this. To generate analysis diagrams in manual method we opted for a spreadsheet software, but in automatic way with SMPTEG the analysis diagrams were presented directly in the system. Regarding to step reserved for performance test results it is a new option in SMPTEG system which is not applicable in the manual method made in the previous study [10]

5. CONCLUSION & PERSPECTIVES

In this paper, we presented technological problems in social networks field, we also presented the modeling and the functioning of our SMPTEG System which we propose as a tool allowing the generation of performance tests for the analysis of data gathered from media network. We have also cited in this paper the state of the art of different types of analysis in Social Media analytics and all of the existing analysis tools. In addition, by noting that the advances are made more in technological matter than in tools, so, the analyzes that we come to present are often done for the textual content, however today we are talking about images and emojis that we must not neglect and which currently represent an essential way of expressing on social networks. So, it is time to focus future studies on the search for solutions helping to analyze and highlight them, and of course will undoubtedly be a technology that will develop the SMA field and which will be one of the tools of tomorrow. As perspectives, for next study, we will work on this said aspect, and above all, make in-depth experimental studies in order to be able to properly adjust our system that we have presented in this paper, and to enrich and evolve its functionalities, so to adapt it with all existing social networks by showing a clear map of those taken into account by the SMPTEG system.

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