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A proposed social network analysis platform for big data analytics

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ABSTRACT

This paper presents an important concept of Internet of People, a social network analysis approach to perform Big Data Analytics. The paper describes the development, management implications and analysis. To illustrate six points in the management issues, an in-house development of a SocialNetwork API with six functions has been demonstrated. The proposed method is focused on processing the contacts who click like or comment on the author's posts, as well as the queries and visualization. Results can be extracted and presented in data visualization. Six functions in the SocialNetwork API have evaluation tests, including a large scale of 50,000 simulations completed within 60,000 s. Results support our case of Big Data processing for social network analysis can be equivalent to CRM, ERP and MIS. Additionally, there are no costs involved. Related topics have been discussed in details. Our research contributions have been consolidated since our work have met research challenges for social network analysis and six management implications.

1. Introduction

The concept of the Internet of People (IoP) has started since Bruce (1999) has investigated the people's perceptions on the internet and has conducted survey with data analysis to support his points of view. This concept has been further exploited by McCown et al. (2001) who have conducted a similar study to understand men and women's perceptions about the use of internet. Both papers lack of any in-depth discussion about the IoP as follows. First, it was the Web 1.0 era at the time of the research and questionnaires were focused on Web 1.0 interaction and perception. Second, there was a lack of understanding about how people could interact with the use of the internet before the rise of social networks and the availability of smart phones to make such information widely available. Liu and LaRose (2008) focus on the people's satisfaction with the use of internet and have designed questionnaires for the use of Web 2.0. They use a college as an example to illustrate their concept but their approach does not show whether it is relevant for other organizations. Takahashi et al. (2009) have conducted a survey on IoP with depressive tendencies. They survey on people who have actively used social network analysis in order to understand their thoughts and behaviors. This paper is considered one of the early versions of research work to study IoP with the use of social networks, which is defined as a direct way to have communications, sharing of information and thoughts and build up friendship and trust over a period of time. Since then, there are research papers on social networks, which have used Cloud Computing, broadband networks, Big Data and smart devices like IoP does. Similar to IoP, the challenge for social

networks is to understand the interaction between physical contexts and objects, between people and people and between communities and communities.

Social networks have been pervasive in our everyday part of many peoples' lives. It was illustrated by Mitchell (1969) who demonstrated the concepts and fundamental of social networks. However, in recent years, social network analysis has been used to study the relationship between different people and organizations, as well as dynamics, sentiment analysis and activities that other circles of networks being involved (Akuma et al., 2016; Karyotis et al., 2017). Social network analysis has become increasingly important for Big Data services since there are millions or billions of information, such as updates, exchanges of emails and updates, photographs, videos and sharing of all these items online on the daily basis. While there is a vast amount of information generated, intelligent algorithms and systems are required to extract, process and make sense of the information, so that the processed information can provide better values to the users, businesses and organizations involved. Social network analysis is relevant to Big Data development since a lot of data can be generated on the daily basis (volume); the rapid growth of data has always happened and will be expected to be more on demands (velocity); different types of data such as images, videos and text are required (variety); a high extent of accuracy for data processing and analytics is necessary (veracity) and all the information can provide real values to the society through fund raising, announcement of important news and support of humanity (value) (Chen et al., 2014; Chang, 2017). In order to illustrate effectiveness of social networks in the era of Web 3.0 and Industry 4.0 that

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use people, services and time (availability and responsiveness) as the key factors, websites and applications such as Facebook, LinkedIn, Twitter and any customer-relation services can be used to study the impacts of social networks and study how social networks can be used for business and management development.

Dated back in 2003, Facebook was started as a testbed platform of social network at Harvard University. It has become one of the most popular social network websites with more than 1 billion users on the Earth. According to [Forbes \(2017\)](#), Facebook and Mark Zuckerberg have the net estimated value of US \$74 billions. Similar to other social network websites, Facebook become a platform for people to broadcast their headlines, share any information and interact with friends easily who can be geographically away or who do not meet as often as they can. Instagram is another social network website focusing on the posting photographs online in real-time. It was acquired by Facebook in 2010 to strengthen their lead in social network community. Together with Facebook, both websites have created a phenomenon of creating “selfies” online. This trend has both positive and negative impacts. In terms of positive impacts, friends and families can have live updates of their close ones and need not meet or call them to find out. However, the downside is that some users tend to post photographs to show off their recent activities and it has become websites for some people to show their luxurious life styles. These users tend to post pictures of visiting different countries, restaurants and places of interests with their thoughts and sharing frequently and regularly. This can create unpleasant feelings for friends who have lower social status since they are unable to afford all these ([Scott, 2012](#)).

LinkedIn is a social network website focusing on building professional network for each user, so that they can strengthen their network power and activities which include job hunting, sharing of opinions and posts, community building and recommendation to their peers. The positive side is that people can stay in touch with their networks even if they have not met for years or they can use LinkedIn to improve their professional relationships with their peers. One commonly-use feature is the recommendation to their networks since it can be influential to the human resource recruiters who do not know the applicants and use their networks' recommendation as sources of references. However, the downside can be that the recommenders only knows certain aspects of their recommendees and it can be only a glimpse of their overall abilities and skills. Additionally, skills can be “variables”. If person A worked as a Security consultant but did not practice his skill for more than five years after changing jobs, the recommendation on his LinkedIn profile is perhaps not as accurate as his most recent CV and recommendation from his most recent employer. Twitter is another popular social network website, which allows users to post their live updates, thoughts and sharing of pictures, links and videos. It allows organizations and individuals with high social status to promote their events, campaigns, products and services. Individuals of any social status can do the same without problems. Providing information in real-time can reach to many communities and individuals and this is particularly useful when there are disasters, accidents and calamities that many people can know such catastrophes have happened and then prevent themselves from being near to the places of disasters, or share their condolence with their networks. However, the downside of using Twitter is similar to the case of Facebook and Instagram, in which some people do show off their lavish life style and influence their opinions to win over the controversial cases. Another downside is that people have posted their thoughts and personal feeling (the text such as “I am hungry” or “I am going home now”) which provide little or no values to the research community. It has become a platform to know their people's private lives since users can know secrets of their preferred celebrities and idols. The abilities to process and analyze a large amount of data, and even in real-time, can be important for businesses and management. Up-to-date and accurate information can be obtained and presented in real-time, so that businesses can always stay competitive by making better decisions and strategies. They can get close to users

and customers' real opinions about their products, services and feedback ([Grzywaczewski and Iqbal, 2012](#); [Mahmud et al., 2016](#)).

There are different types of technologies that can process and analyze a large amount of data. The use of Application Programming Interfaces (APIs) have been commonly used to reduce the level of complexity of running the large scale simulations. The level of code writing is reduced and streamline. Facebook APIs were available for developers to organize thousands and millions of user data efficiently ([Facebook, 2013](#)). The creation of Facebook API can help achieve this target with the following reasons. First, some data available in the social network websites are not fully exposed. The intelligent methods are required to extract and present the data. Social networks such as Facebook have released their API development and guideline. Second, the use of API can extract data from Facebook seamlessly and make use of the existing APIs or API methods in Facebook to analyze and present the data. For example, data visualization is used to present multiple data analysis and reduces the level of complexity of explaining tough issues such as mathematical modeling of data analysis, correlation between different data and variations in user behaviors ([Chase, 2013](#)). This motivates us to develop an innovative and easy to use API that can process data and present the results in a way that anyone without much prior knowledge can understand.

To demonstrate this, we have proposed a Social Network Analysis Platform focusing on a proposed social network analysis approach, represented by developed SocialNetwork API, and explain the architecture, the usage scenario, results and analysis of the user behaviors in the social network. Social network analysis is designed to extract and process data utilized by Facebook and is presented in visualization (graphs, analytics and reporting system) so that users without technical background can understand the complexity in social network science for Big Data. To demonstrate a good flow throughout this paper, the structure of this paper is as follows. [Section 2](#) describes the related literature and the proposed social network analysis platform. [Section 3](#) explains the use of Social Network API with the examples and scenarios adopted. [Section 4](#) illustrates performance evaluation of using SocialNetwork API. [Section 5](#) presents topics of discussion to justify our research contributions and [Section 6](#) sums up Conclusion and Future work.

2. Related literature and the proposed social network analysis platform

This section presents literature that leads to the development of this research and the architecture required to make it happen.

2.1. The literature review

Social networks provide Web 2.0 model to allow each user to broadcast about themselves and then interact with their peers. The speed of interaction is in real time and instant to allow contacts to know places and events that they have never been but they are able to feel as if being present in the event. Detailed information of important moments such as the wedding, graduation ceremonies and birthday celebrations for big ages have attracted many contacts clicking likes and leaving their comments. There are no costs involved in doing this. Social networks have changed the way that people interact with one another with behavioral changes ([Gross and Acquisti, 2005](#); [Farkas, 2007](#); [Glanz et al., 2008](#)). Researchers have identified reasons as follows. First, a variety of communications such as live update, chats and videos allow contacts in the social network to communicate directly and indirectly with each other and their network's friends. Second, a vast amount of information can be shared and posted on the daily basis which have changed the pattern of social interactions for some people, since some are on the receiving end (read updates and seldom respond) and some are on the giving end (regularly updates regardless of feedback). Third, more people can follow their celebrities that they can

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