Journal of Universal Computer Science, vol. 20, no. 15 (2014), 2068-2079
submitted: 15/1/14, accepted: 30/9/14, appeared: 28/12/14 © J.UCS

Does a Change in Weekend Days Have an Impact on Social Networking Activity?

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Abstract: Twitter has gained phenomenal popularity over time, especially in Saudi Arabia, where it enjoys unmatched usage and is considered highly attractive. Tweets are now an important source of trend-setting and marketing along with their conventional use for information exchange. Recently, Saudi Arabia changed its working days so that weekends are Friday and Saturday instead of Thursday and Friday. To identify the impact of such a change on the usage of social networks, five detailed experiments are conducted. Time-stamped data for selected individuals are retrieved from Twitter and analyzed accordingly to observe usage behavior. Moreover, the results of these experiments are compared with results obtained last year, before the weekend was changed.

Keywords: Weekend change connectivity, Saudi Social activity trends, Saudi Facebook connectivity, Saudi weekend Twitter, best time to Tweet
Category: E.2, M.1, M.6

1 Introduction

The usage of Twitter for marketing is very common. Twitter is a medium of communication and information sharing for various purposes, including opinion making, advertising, counseling, and customer feedback. Twitter, in contrast with Facebook, is considered reliable and user-friendly in terms of sending directed and comprehensive messages in very short texts. Twitter has recently attained overwhelming popularity. Some recent research studies [BBC, 14] [Alwagait and Shahzad, 13] [Basit et al, 13] have shown that the number of active users has grown beyond 554 million with the addition of 0.14 million new users daily. Over five-hundred million tweets are sent daily, while the number of Twitter search engine queries exceeds 2.1 billion per day. Studies have also determined that 43% of users use Twitter on their mobile phones. Twitter currently employs 2,500 employees, and its advertising revenue in 2014 exceeded one billion U.S. dollars for the first time in the company's history.

Recently, advertising on social media websites has proven to be very effective. Some extensive research studies [Caneli et al, 12] [Canopy et al, 13] [Shahzad and Alwagait, 14] [Duijn, 12] have addressed the effectiveness, readability, and social impact of such advertising. Fisher [Fisher, 13] presented valuable statistics in his

research. He found that Saturday and Sunday are the best days to tweet, as 17% more engagement is observed. He also showed that 19% of commercial brand accounts tweet on these days to maximize the number of users viewing their tweets. Wednesday and Thursday are the days with the least Twitter activity. Fisher [Fisher, 13] extended his study to identify the peak times for tweets. The study stated that 8:00 a.m. to 7:00 p.m. is the peak tweeting time and that 30% more engagement is observed during these 11 hours. It was also reported that 64% of commercial brands advertise during these 11 hours of activity. The length of the tweet is also a major component in determining the level of engagement. Tweets containing fewer than 100 characters gain 17% more engagement, while tweets with hashtags get twice as much coverage as those without hashtags [Derek et al, 10] [Zarella, 13] [ImageForSuccess, 13].

The advertising and marketing of particular brands and services require the identification of the target audience [Marteen, 11]. Fisher [Fisher, 13] did not consider the impact of time zone differences, which may have an effect on tweet visibility. Several methodologies [Marijtje and Jeroen, 6] [Santos se al, 7] [Scott, 00] have emerged over time to monitor current trends in social networks. Few analysis techniques [Scott, 96] [Scott, 13] have been used. Canopy [Canopy, 13] provided a guide that helps in identifying and maintaining a user's followers and estimates suitable tweeting times to gain more engagement. Dan Zarella [Zarella, 13] stated that 5:00 p.m. is the peak time when retweets are done, with 6% more retweets compared to other peak hours. Zarella [Zarella, 13] also identified that the best tweeting frequency is one to four tweets per hour, the best times to tweet are noon and 6:00 p.m., and the best day to tweet is at mid-week and on weekend days. Socialbro [Scott, 13] provided an automated way of generating reports on the best time to tweet for customized users. The online tool helps in identifying the best time to tweet for a given user. Socialbro's tool costs hundreds of dollars to generate an online report about the targeted individuals by identifying their best and worst times to tweet.

The ImageForSuccess organization [ImageForSuccess, 13] published its findings on the best and worst times to post on different social networking sites, including Facebook, Twitter, LinkedIn, and Google+. The organization has found that the time slot of 1:00-4:00 p.m. is the best time to post anything on Facebook, while 8:00 p.m.-8:00 a.m. is the worst time to post on Facebook. For Google+, the best time to post is 9:00 a.m.-11:00 a.m., while the worst time is 6:00 p.m.-8:00 a.m. For Twitter, the best time to post is 1:00 p.m.-3:00 p.m., and the worst time is 5:00 p.m.-6:00 p.m. The best time to post on LinkedIn is 7:00 a.m.-9:00 a.m. or 5:00 p.m.-6:00 p.m., while the worst time is 10:00 p.m.-6:00 a.m. Like Fisher's results [Fisher, 13], the results of this study are also general and do not target individuals based on time zone or other collaboration parameters.

The aforementioned literature extensively describes the importance of different social networks and strives to identify the best times to enhance the viewership of social networking posts. Accordingly, considerable research has been done to identify the best and worst times to tweet [StatisticBrain, 13]. Considering the facts mentioned above, the current study will identify the change in trends in social connectivity based on experiments performed on five different scales with thousands of users. Considering the existing literature, the current research study is designed to answer the following research questions:

a. Question 1: How are data acquired and analyzed? What specific patterns are identified?
b. Question 2: What are the best and worst times to tweet to maximize tweet viewership?
c. Question 3: How did the changing of weekend days affect social media activity for Saudi Arabian users?

2 Data Acquisition

2.1 Data Retrieval

The selection process started with a predefined set of well-known users (in the "Experiments" section, we will explain how these sets are defined). The set contains the Twitter ID, Twitter username, number of followers, and country of all users. The set is sorted by the number of followers. To cope with Twitter API limitations (i.e., the number of API calls per hour), we sometimes had to choose a smaller random set without affecting the accuracy of the study. To complete the experiments and collect data hourly without being affected by the API limitations, we had to ensure that the total number of followers was within our capacity.

2.2 Data Selection

Twitter has a rich application programming interface (API) for third-party applications. Third-party applications can fetch various types of information from Twitter, such as messages, tweets, and followers. They can also query Twitter data by keyword, hashtag, and username. To retrieve detailed information about the followers of a specific user, a sequence of steps must be followed:

a. Retrieve follower IDs: This step can be achieved by using the API to retrieve all the follower IDs of a particular user. We store those IDs to be used in the next step.
b. Retrieve follower information: In this step, we iterate through all the IDs retrieved in the above step, divide them into multiple requests, and send these requests to Twitter to obtain detailed information for each follower.

Since we had a pre-defined set of users, we retrieved all the follower IDs for all users at the beginning of the study and stored them in a database to use them later. We scheduled a process to retrieve users' information every hour. Each time we retrieved user information; we extracted the timestamp property "last seen." This property is provided by Twitter and indicates when the last activity of the user occurred. We use it to determine whether the user is online or not. A user is online if his "last seen" status is less than an hour removed from the time of the experiment.

3 Experiments

This study comprises five experiments conducted on five data sets. Each of them is designed to reflect a specific type of Twitter user based on the number of followers.

The first data set consists of 1,000 users, and the analysis will seek to determine the pattern of the online availability of the followers of those 1,000 users, and data on online users will be registered accordingly. In the second increment, the study is extended to 100 users with an average of 10,000 followers each. In the third and fourth increments, we expect to have 10 users with an average of 50,000 followers each, and finally, a single user with around one million followers will be observed. Note that the more followers the users have, the smaller the set will be. This will enable us to execute the experiments without exhausting all API calls.

The experiments performed in the study cover a broader spectrum of the data sets that guide the process of consolidating the results. Generally, experiments done on millions of data sets will possess a higher trust level and fewer errors, while experiments with thousands of data sets are expected to be less prominent. The reason for considering all these experiments in this study is to demonstrate the patterns of online followers for the given users and how the trend is governed. Based on the trends, a user can determine when most of his followers will be online so that a tweet can be sent at that time to maximize viewership.

As trends in marketing and social influence are changing rapidly and social networks are gaining more power to influence individuals, it is important from an influencer's perspective to identify when his/her campaign attains more value. Many big names in the technology world, such as Samsung, Dell, HP, LG, and Sony, have Twitter accounts that they utilize for the purpose of advertising. Thus, it is important to identify when a tweet attains more value and audience attention so that the objectives of posting tweets are met.

3.1 Experiment 1

Figure 1 demonstrates the statistics from the identification of the online followers of the selected users. Throughout this discussion, the experiments performed in 2014 (when the weekend days were Friday and Saturday) are referred to as the "recent experiments," while the experiments performed in 2013 (when the weekend days were Thursday and Friday), the experiments are referred to as "reference data." In the recent experiments, the maximum following is observed on Sunday and the minimum following is found on Thursday. Furthermore, the momentum of online followers increases during the weekend days, i.e., Thursday and Friday. In the reference data, the maximum number of online followers was observed on Friday, while Thursday has the lowest following. This trend suggests that acceleration occurs in social networking activity on weekend days. The trend line and area graph on the left demonstrate the current data, while the right-side graphs show the results of the reference experiments.

3.2 Experiment 2

Figure 2 shows that, in the recent experiments, the maximum following is observed on Wednesday and the minimum following is found on Sunday. Furthermore, the momentum of online followers increases during the weekend days with a slight slope on Thursday; a significant increase is observed in following on Friday, with a slight decline on Saturday. In the reference data, the maximum number of online followers was found on Friday, while Thursday has the lowest following. This trend suggests that acceleration in social networking activity occurs on weekend days. This shows

that activity on weekend days is consistent with the reference data, while the business days (Sunday-Thursday) have different patterns; i.e., in the reference data, a slope is observed on the working days, while, in the current experiments, an inconsistent following trend is observed.

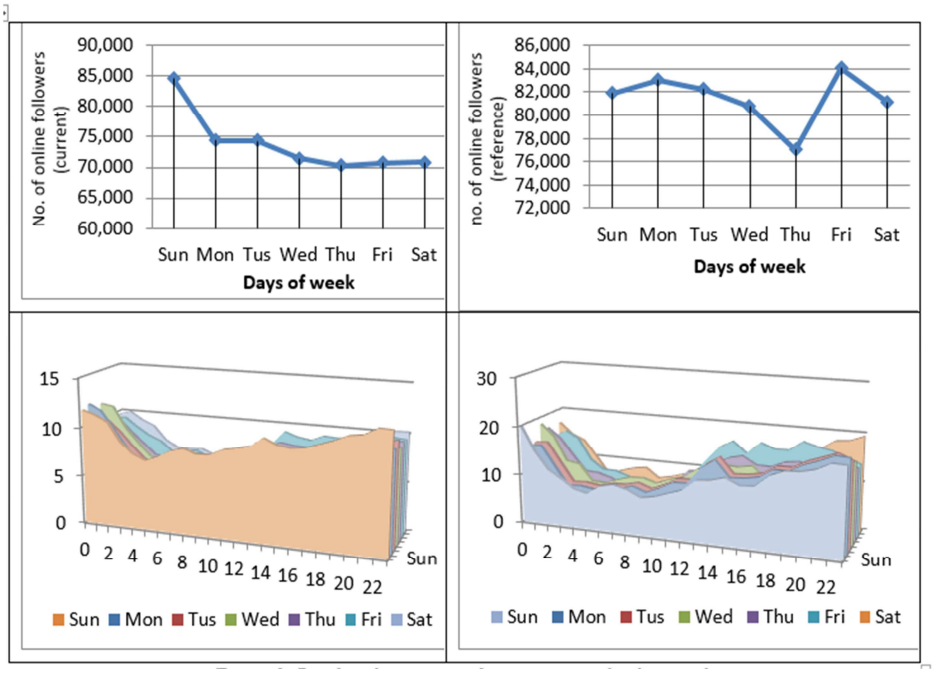

Figure 1: Results of experiment 1 on current and reference data

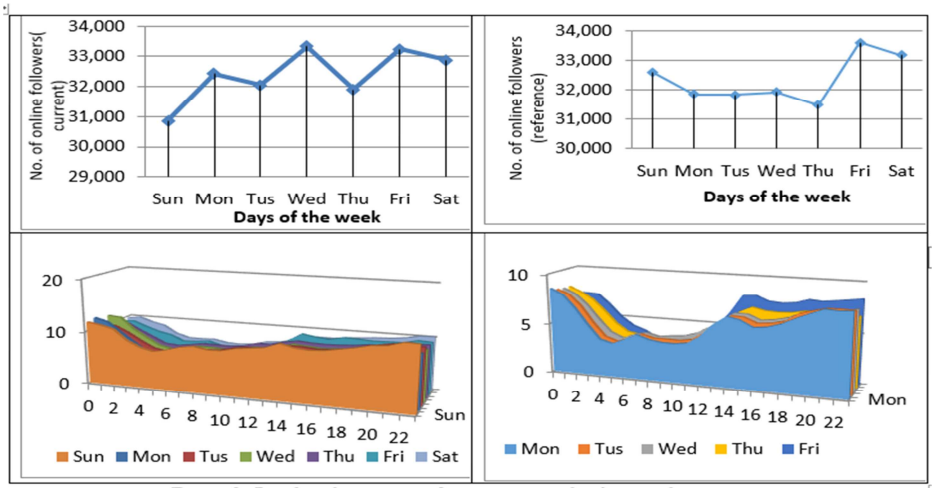

Figure 2: Results of experiment 2 on current and reference data

3.3 Experiment 3

Figure 3 shows that, in the recent experiments, the maximum following is found on Friday and the minimum following is observed on Tuesday. Furthermore, the momentum of online followers increases from Wednesday to Friday, with a slope on Saturday that also gains some height on Sunday. In the reference data, the maximum number of online followers was observed on Friday, while Saturday has the lowest following. This trend suggests that acceleration is found in social networking activity on weekend days, while Saturday has a decreasing curve. This shows that activity on weekend days is consistent with the reference data, while the working days (Sunday-Thursday) have different trends; i.e., in the reference data a bumpy curve is evident, while, in the current experiments, an increasing curve is evident from Tuesday to Friday.

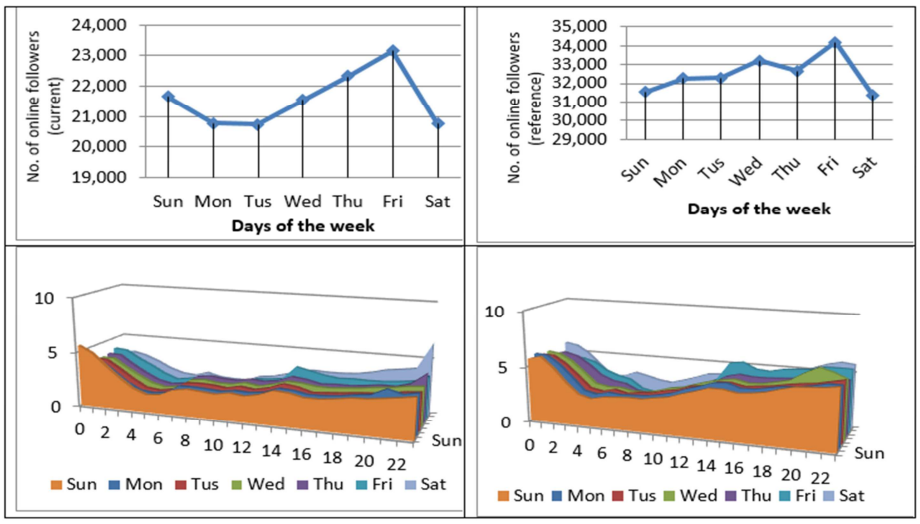

Figure 3: Results of experiment 3 on current and reference data

3.4 Experiment 4

Figure 4 shows that in the recent experiments, the maximum following is observed on Saturday and the minimum following is observed on Thursday. Furthermore, the momentum of online followers increases from Friday to Monday, with a slope on Wednesday and Thursday. In the reference data, the maximum number of online followers was found on Thursday, while Saturday and Sunday have the lowest following. This trend suggests that acceleration is observed in social networking activity on weekend days, while Saturday has a decreasing curve. This shows that activity on the weekend days is consistent with the reference data, while the working days (Sunday-Thursday) have different trends; i.e., in the reference data, a bumpy curve is evident, while, in the current experiments, an increasing curve is evident from Wednesday to Friday.

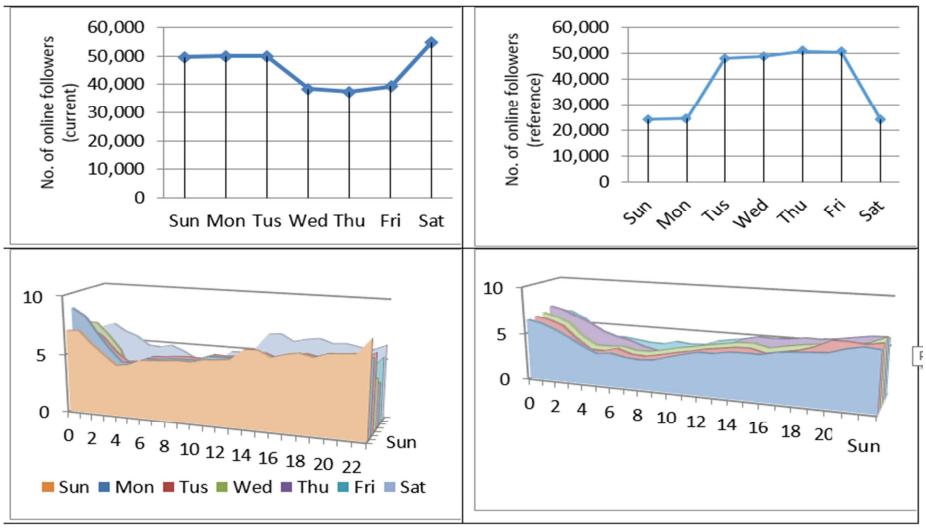

Figure 4: Results of experiment 4 on current and reference data

3.4.1 Experiment 5

Figure 5 shows that, in the recent experiments, the maximum following is observed on Wednesday and the minimum following is found on Saturday. Furthermore, the momentum of online followers increases Sunday to Wednesday, with a slope from Thursday to Saturday. In the reference data, the maximum number of online followers was found on Monday, while Thursday has the lowest following. This trend suggests that acceleration is observed in social networking activity on working days, while the weekend days have a decreasing curve. In the reference data, an uneven curve demonstrates the accelerated social networking activity in the first two business days and relatively less connectivity on weekend days.

4 Analysis

The connectivity patterns of the current experiments and the reference data are presented here. To derive a mathematical formulation from the values, numeric values are assigned to the connectivity patterns. We assign the weight as follows: H=3, M=2, and L=1. The cumulative score for all experiments can describe the level of social networking activity connectivity. In a continuation of the weighting assignment, the following patterns are observed:

Cumulative Score =>10: High social connectivity

Cumulative Score >7 and <10: Moderate social connectivity

Cumulative Score <=7: Low social connectivity

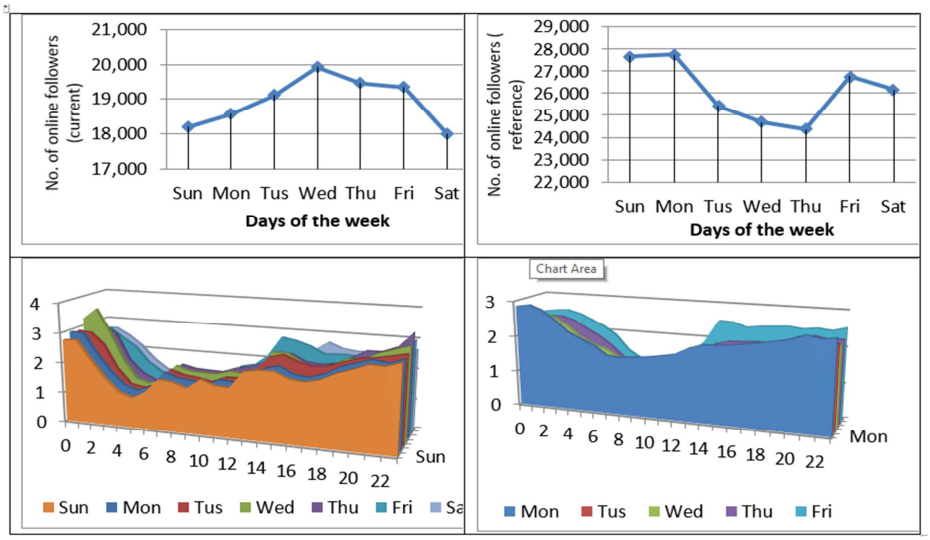

Figure 5: Results of experiment 5 on current and reference data

Experiment #	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Experiment 1 (current data)	H	M	M	L	L	L	L
Experiment 2 (current data)	L	M	M	H	M	H	M
Experiment 3 (current data)	M	L	L	M	H	H	L
Experiment 4 (current data)	H	H	H	M	M	M	H
Experiment 5 (current data)	L	M	M	H	H	M	L
Experiment 1 (reference data)	L	M	L	L	L	H	L
Experiment 2 (reference data)	L	L	L	L	L	H	M
Experiment 3 (reference data)	L	M	M	H	M	H	L
Experiment 4 (reference data)	M	M	H	H	H	H	M
Experiment 5 (reference data)	H	H	M	L	L	M	M

Table 1: Social connectivity for current and reference experiments for experiments 1-5.

Experiment #	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Experiment 1 (current data)	3	2	2	1	1	1	1
Experiment 2 (current data)	1	2	2	3	2	3	2
Experiment 3 (current data)	2	1	1	2	3	3	1
Experiment 4 (current data)	3	3	3	2	2	2	3
Experiment 5 (current data)	1	2	2	3	3	2	1
Cumulative score	10	10	10	11	11	11	8
Cumulative score for whole week							71

Table 2: Numeric assignment of social connectivity for current experiments

Experiment #	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
Exp. 1 (reference data)	1	2	1	1	1	3	1
Exp. 2 (reference data)	1	1	1	1	1	3	2
Exp. 3 (reference data)	1	2	2	3	2	3	1
Exp. 4 (reference data)	2	2	3	3	3	3	2
Exp. 5 (reference data)	3	3	2	1	1	2	2
Cumulative score	8	10	9	9	8	14	8
Cumulative score for whole week							66

Table 3: Numeric assignment of social connectivity for reference experiments

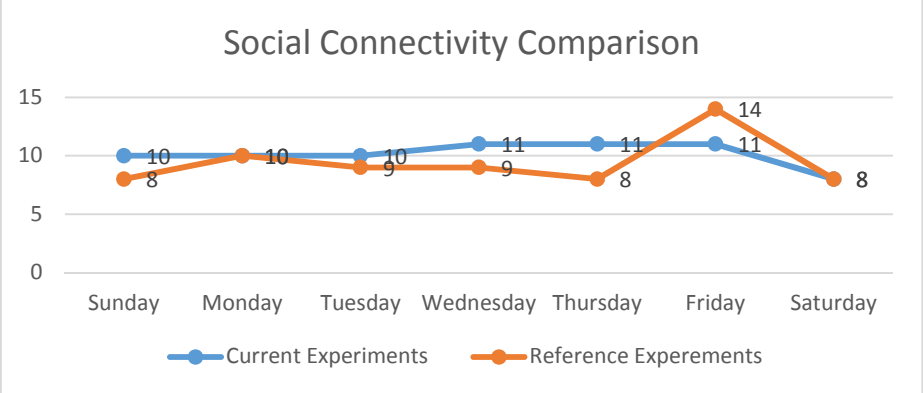

Figure 6: Social connectivity comparison before and after the weekend change

5 Findings

The findings of the study based of the five experiments are mentioned below:

- Friday is the busiest day of the week for social connectivity.
- Significantly more social connectivity is observed on Sunday, Wednesday, and Thursday.
- The lowest number of followers is online on Saturday.
- A major part of social connectivity is done after office hours.
- The peak of social activity occurs between 10:00 p.m. and 2:00 a.m., while a slope is observed from 4:00 a.m. to 2:00 p.m., suggesting that most social networking is done late at night.
- With the weekend change, the social connectivity curve has normalized and achieved uniformity.
- Friday has seen the maximum social connectivity before and after the weekend change.
- Wednesday, Thursday, and Friday have 10% more connectivity than Sunday, Monday, and Tuesday.
- Compared to Saturday, there is 37% more connectivity on Friday, Thursday, and Wednesday, and 25% more connectivity on Sunday, Monday, and Tuesday is observed.

6 Conclusion

The initiative of changing the weekend days has positively affected social networking and connectivity. Friday remains the busiest day as far as connectivity is concerned, while the least social activity is observed on Saturday. After the weekend change, more connectivity is found on working days, but the patterns of increased connectivity after office hours and a connectivity peak around 10:00 p.m. to 2:00 a.m. have remained unchanged. The changes identified in this extensive study are of keen interest to national and international brands that want to advertise on Twitter to convey the advertising to the maximum number of available followers. Opinion-makers may also use the findings to identify a more appropriate time to tweet since the weekend days have changed. Other enterprises may also deem the findings suitable to their interest in exploring and converging toward more efficient decision-making.

Acknowledgements

This research work was funded by the Research Center of the College of Computer and Information Science. The authors are thankful to the RC for this.

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