Social Media Analysis of Higher Education Institutions in UAE

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ABSTRACT

This paper presents social media analysis of data obtained from twitter handle of three types of higher education institutions and evaluate students' involvement of higher education in the United Arab Emirates (UAE). The higher education institutions are divided into three sections:

1) Federal Institutions (3 in number)

2) Local institutions (7 in number)

3) Foreign University campus (8 in number)

It was observed that students were inclined to University twitter handle for both educational and non-education aspects. Many of the tweets were focused on students discussing about their experiences and academic motivations. The study was divided into two parts, wherein, at first tweets related to above mentioned three types of higher education are collected. Secondly, the collected tweets are classified into sentiments. The paper also does a comparative study of the sentiments between higher education's paving way for future explorations.

General Terms

Social Media Analysis, Sentiment Analysis

Keywords

Naïve Bayes Algorithm, Sentiment polarities, Twitter, Federal Institutions, CAA, KHDA, Foreign University Campus

1. INTRODUCTION

Social Media interactions between higher institutions and students in a real-time environment custom a substantial source of data. These communications are allied to university news and events on every day basis. These interactions include students discussing feedback about the events, apart from academic conduct. Use of twitter handle by universities, creates an open platform of communication. The open exchange with the participation of students and university helps to bridge and interlock formal and informal learning contexts [1]. It is due to this reason, use of social media by higher institutions are given key prominence [2].

We have done a combined comparative analysis of students' reactions towards university postings in terms of sentiment polarity (Positive or Negative). The study matches categorical model by using six emotion categories [3]: Anger, Fear, Joy, Sadness, Surprise and Disgust. Joy and Surprise are taken as a Positive polarity, whereas Anger, Fear and Sadness belong to Negative polarity in the binary classes, respectively. There are plentiful established approaches for recognizing the polarities, however, Naïve Bayes (NB) and Support Vector Machines (SVM) are the most frequently used algorithms for solving sentiment classification problem [4]. We used NB Algorithm for conducting sentiment analysis, where, sentiments are classified into 6 parameters [3] as – Anger, Disgust, Fear, Sadness, Joy and Surprise.

The main contribution of this paper thus is to bring sentiment analysis in analyzing social media content - especially microblogs- to act as a supportive indicator of responses towards university postings. In section 2, we present the detailed structure of 3 types of higher institutions along with the twitter usage by them in detail. The paper proposes the social media analysis model in section 3. Results and discussion on using sentiment analysis for twitter data in university context are shown in section 4. Finally, a conclusion and outlook are presented in section 5.

2. TWITTER USAGE UAE UNIVERSITIES

The total number of CAA approved higher education institutions in UAE are 76 [5]. These institutions include some of three types of institutions. The other approval authority in UAE is Knowledge and Human Development Authority (KHDA) in 2012 was 53 [6]. It was observed during the study that twitter was used by these institutions as main medium for universities to post events and activities. On the other hand, students use it to express reactions and emotions. Students were experienced on the usage of various forms of social media [7]. Based on this fact and the increasingly usage of twitter, it now seems mandatory to post news about university updates on twitter and gather opinions for students and public accordingly.

Table 1 presents the detailed structure of sample of institutions selected for research and usage of twitter. The interesting observation noticed regarding the usage of twitter by all three categories of UAE universities are:

1) Universities use twitter to post updates concerning news and events.

2) There was no linkage between the feedback send by the students and subsequent tweets by universities.

3) Most of the tweets by local universities and federal universities were in Arabic, and thus were overlooked while piloting research. This is the reason; the number of tweets were quite low for these institutions. The trend is now changing for local universities, while federal universities are still using Arabic as the language for tweet.

4) Almost all of the tweets by Foreign institution campuses were in English, and included to conduct the study.

Table 1: List of UAE Universities and Twitter Usage

		University Name	Twitter Handle	Usage of Twitter by universities	Follo wers
GROUP 1 Federal Universities	1	Zayed University	https://twitter.com/zayed_u	news, events, activities, Announcements, articles, services	74.5k
	2	Higher Colleges of Technology	https://twitter.com/HCT_UAE	news, events, activities, articles	44.2k
	3	United Arab Emirates University	twitter.com/uaeu_news	University events & news	27.1k
GROUP 2 Local Universities	1	Masdar Institute of Science & Technology	https://twitter.com/MasdarInst	University events & news	66.5k
	2	Mohamed Bin Rashid School of Government	https://twitter.com/mbrsg	news, activities	31.5k
	3	Hamdan Bin Mohammed Smart University	https://twitter.com/HBMSU	events, news, invitations, ceremony, knowledge tweets	31.3k
	4	Abu Dhabi University	https://twitter.com/abudhabiuni	news, events, activities, announcements	19.3k
	5	Ajman University of Science & Technology	https://twitter.com/ajmanuniversity	events, activities, announcements, workshops, news	17.1k
	6	American University of Sharjah	https://twitter.com/AUSharjah	news & events, activities, announcements, Quote of the Day	15.9k
	7	Khalifa University	https://twitter.com/KhalifaUni	news, events, activities, announcements	13.1k
GROUP 3 Foreign institution campuses	1	Paris Sorbonne University Abu Dhabi	https://twitter.com/SorbonneAD	shared from facebook	4276
	2	Middlesex University Dubai Campus	https://twitter.com/MiddlesexDubai	news, events, activities, invitations, announcements	3959
	3	Murdoch University Dubai	https://twitter.com/MurdochUniDubai	events, announcement, news, activities, invitations	3058
	4	University of Wollongong in Dubai	https://twitter.com/UOWD	events, activities, announcements	2731
	5	Manipal University Dubai Campus	https://twitter.com/ManipalDxb	articles, news, activities	2068
	6	Amity University Dubai	https://twitter.com/AmityDUBAI	news, activities, events, invitations, announcements	1197
	7	Institute of Management Technology Dubai	https://twitter.com/imtdubaicampus	news, activities, invitations, articles	536
	8	Shaheed Zulfikar Ali Bhutto Institute of Science & Technology Dubai Campus (SZABIST)	https://twitter.com/szabistdxb	news, activities, events, invitations, announcements	459

3. SOCIAL MEDIA ANALYSIS MODEL

The section presents the social media analysis model to evaluate the polarities of responses using twitter as a tool. Thorough illustration of the model is depicted in Figure 1, wherein, at first the combination of tweets from three types of institutions are collected separately. Once these tweets are collected,
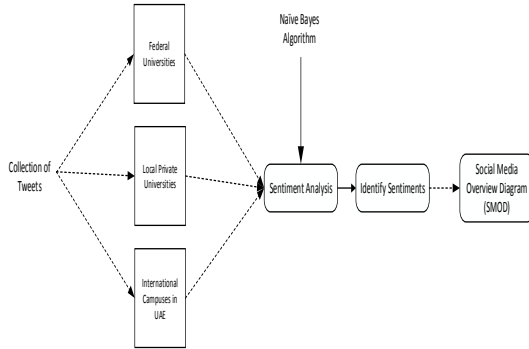

Figure 1: Social Media Analysis Model

As mentioned in the figure, we first collected the posting and responses from the twitter accounts of these universities between 01-07-2017 to 31-07-2017. As already mentioned these tweets were regarding universities news, activities and events. To these tweets, we collected feedbacks through twitter handles of respective universities. For evaluation by Naïve Bayes Algorithm, the preprocessing step converted the tweets into tokens as mentioned in table 2 below:

Table 2: Tokens and Bag of Words from three types of Institutions

Institution Type	No. of Tweets*	Tokens generated	Bag of Words
Group 1	10	131	79
Group 2	159	2252	490
Group 3	233	3294	693

*other language tweets ignored

Following are important observations from table 2:

1. The usage of tweets as a real-time communication tool is quite uncommon by higher educational institutions.

2. Twitter is used as a medium for only updates about any activities and not as a tool for continuous interaction between students and universities.

3. As observed, there is no linkage between university tweets and students or external responses.

As identified, the purpose of study is thus single fold, as we need to classify the responses of connections, who are directly or indirectly connected. Based on above-mentioned observations, the social media framework (as proposed in Figure 1), higher education institutions can use twitter as foremost communication tool to apprise students and other external connections. Postings on twitter is done by an authorized authority appointed by universities, wherein, message gets circulated to connections. The message also gets retweeted to even to people who are indirectly connected. The proposed framework forms the foundation for communication through netnographic approach. Netnography is suitable for recognizing connotations and patterns consequential from the communications of online communities [8].

3.1 Naïve Bayes Algorithm

Naïve Bayes Algorithm is used to define the polarities of responses, where, the response for tweets are collected as "bag of words". The algorithm treats each of these responses independently, and identifies the class of each tweet amongst anger, disgust, fear, sadness, joy and surprise polarities is based on Bayes theorem as:

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)} \quad (1)$$

where,

$P(A|B)$ is probability of A, when B is specified.

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$P(A)$ is probability of A.

$P(B)$ is probability of B.

Based on equation (1), the general representation of any of the sentiments are represented as:

$$P(joy|tweet) = \frac{P(tweet|joy)P(joy)}{P(tweet)} \quad (2)$$

$$P(surprise|tweet) = \frac{P(tweet|surprise)P(surprise)}{P(tweet)} \quad (3)$$

$$P(sadness|tweet) = \frac{P(tweet|sadness)P(sadness)}{P(tweet)} \quad (4)$$

$$P(fear|tweet) = \frac{P(tweet|fear)P(fear)}{P(tweet)} \quad (5)$$

$$P(disgust|tweet) = \frac{P(tweet|disgust)P(disgust)}{P(tweet)} \quad (6)$$

$$P(anger|tweet) = \frac{P(tweet|anger)P(anger)}{P(tweet)} \quad (7)$$

It is observed that probability of tweets, $P(tweet)$ is constant, and can thus be ignored. Thus, equations (2-7) can be represented as:

$$P(joy|tweet) = P(tweet|joy)P(joy) \quad (8)$$

$$P(surprise|tweet) = P(tweet|surprise)P(surprise) \quad (9)$$

$$P(sadness|tweet) = P(tweet|sadness)P(sadness) \quad (10)$$

$$P(fear|tweet) = P(tweet|fear)P(fear) \quad (11)$$

$$P(disgust|tweet) = P(tweet|disgust)P(disgust) \quad (12)$$

$$P(anger|tweet) = P(tweet|anger)P(anger) \quad (13)$$

If we represent the sentiments as mentioned by equations (8-13) in terms of polarities, as mentioned by equation (14)

$$p \in (joy, surprise, sadness, fear, disgust, anger) \quad (15)$$

Using equation (15) the generic notation of sentiments are represented as

$$\sum_{i=1}^{l} \prod_{j=1}^{6} P(W_{ij}|p_j)P(p_j) \quad (3)$$

where,

$i = 1..l$ represents the bigrams and $j = 1..6$ represents the polarities.

4. RESULTS & DISCUSSIONS

The research analysis for the study was divided into 3 parts to

elaborate the usage of twitter independently by three types of higher education institutions between 01/07/2017-31/07/2017. Figures (2-4) displays the outcomes of the experiment conducted.
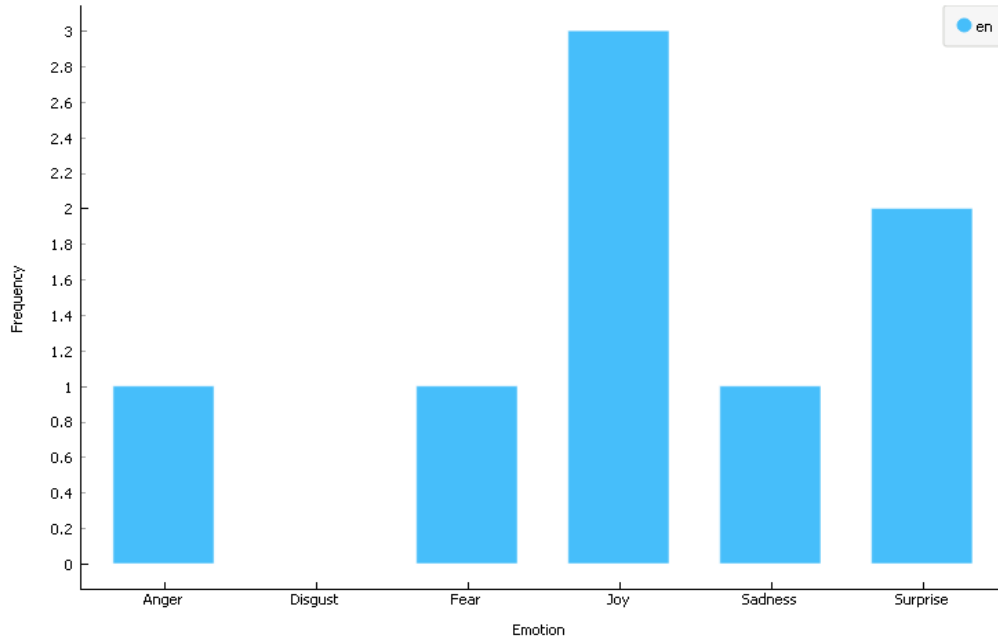
Group 1#Federal Universities

Figure 2: Group 1 Higher Education Institutions twitter sentiment outcomes
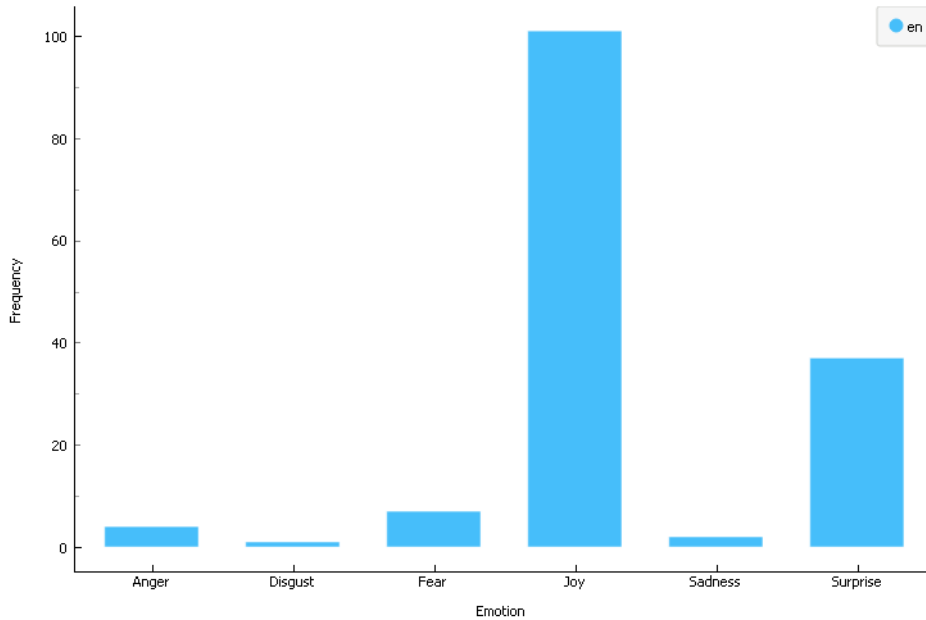
Group 2#Local Universities

Figure 3: Group 2 Higher Education Institutions twitter sentiment outcomes
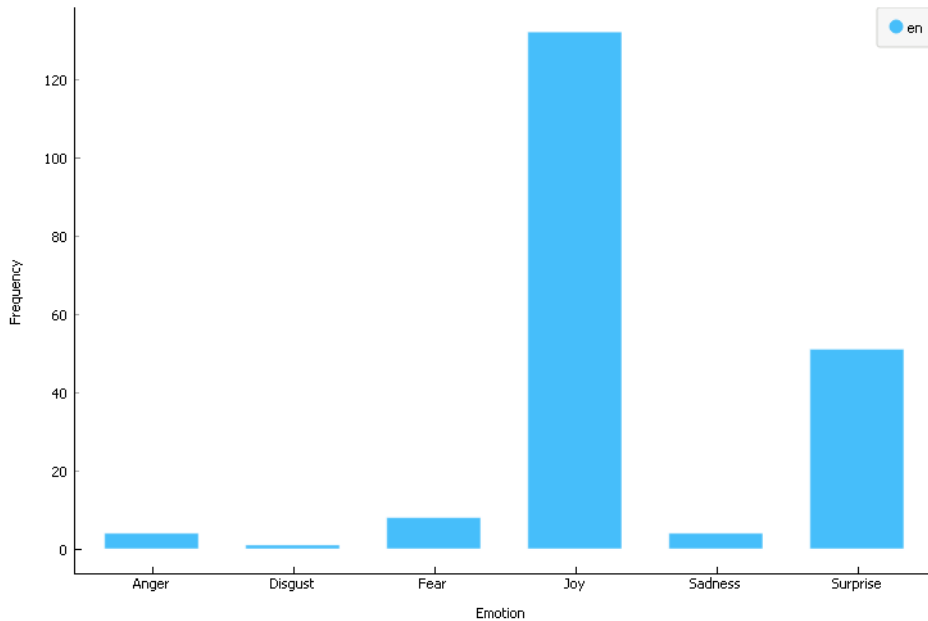
Group 3#Foreign Institution Campuses

Figure 4: Group 3 Higher Education Institutions twitter sentiment outcomes

4.1 Observations

We can effortlessly notice, the distinguishable factors for all three experiments. The summary of observations is:

- For Group 1 institutions, the prominent factors are $\{anger, fear, joy, sadness, surprise\}$ respectively.

- For Group 2 and 3 institutions, the prominent factors are $\{joy, surprise\}$. Although other factors are present, but in negligible quantity.

Also, for Group 1 institutions (Federal Institutions), the response regarding twitter postings is quite depressing, and, one can depict the overall analysis w.r.t. to factor joy as

$$joy \ll \{surprise \cup \text{fear} \cup sadness \cup anger\}$$

However, for Group 2 and 3 institutions (Local Universities and Foreign Institution Campuses), the response in twitter is motivating and one can depict the overall analysis w.r.t. to factor joy as

$$joy \ggg \{surprise \cup fear \cup sadness \cup anger \cup disgust$$

Tweets following the curiosity regarding the move and answering using selection of words will undoubtedly intensify the joy polarity. People, at large, feel to be associated and responded in a way they wanted to be answered would be the right strategy.

5. CONCLUSION

The study clearly indicates the usage of social media by three types of institutions operating in UAE and its impact on stakeholders. Though, the results depict the positive response, institutions and universities should also use social media for other activities (including support research activities, social cause) rather than only updates of events and activities. Social media can also be used as a feedback tool by these universities as a real time communication medium, which will certainly the two-way interaction.

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