

Exploring Sentiments of Voters through Social Media Content: A Case Study of 2017 Assembly Elections of Three States in India

Aman Agarwal and Veena Bansal
Indian Institute of Technology Kanpur, India

Keywords: Sentiment Analysis, Unstructured Data, Campaign Management.

Abstract: **Purpose:** Winning an election requires more than a good and appealing manifesto. The purpose of this paper is to establish that content from the social media provides useful insights and can be used to manage an election campaign provided the right content is properly analyzed. Information such as frequency of mentions, sentiments of the mentions and demography is obtained analysis. This information provides insights into the demography of supporters, topics that are most talked about revealing their importance to the voters, sentiments of voters.

Design/Methodology/Approach: We analyzed 25000 documents from twitter, forums, reviews, Facebook pages, blogs etc. over a period of 12 months in three states of India using Watson Analytics for Social Media (WASM) of IBM. We used ETL (extract, transform and load) utility of WASM to fetch the documents for our chosen themes, topics, dates and sources. WASM deploys deep learning to perform sentiment analysis.

Findings: We found that social media content analysis provides useful insight that goes beyond general perception and can be used for managing a campaign.

Originality/Value: There have been many efforts where researchers are trying to predict election results based on social media analysis. However, these efforts have been criticized as predicting election results is a very complex problem. We, in this work, have shown that social media content can definitely help in gaining a clear understanding of the sentiments of voters.

1 INTRODUCTION

Sentiment suggests a settled opinion that reflects one's feelings. If people express their true opinions and they are available for analysis, one can analyze them to gain insight. Sentiment analysis has been used for classification as well as prediction. Sentiment analysis requires opinions (data) and natural language processing techniques. Advent of *big data* and *deep learning* has made sentiment analysis possible. Sentiment analysis of twitter has been used to predict election results and number of seats after the elections (Burnap et al, 2016, Makazhanov, 2014, Srivastava, 2014). However, these predictions have been critically evaluated as predicting election results is an extremely difficult problem that cannot be solved by analyzing tweets (Gayo-Avello, 2012). Nevertheless, political parties are known to use social media to their advantage during campaign (Ceron et al, 2014, Kapoor & Dwivedi, 2015, Singh et al, 2017). One can analyze reviews and classify them as negative, positive and

possibly neutral. In this paper, we analyze web content including Facebook, twitter, news etc. to gain insight into the sentiment of voters. These insights can be used to manage elections campaign (Ahmed et al, 2016). We review some of the relevant work in next section, research methodology and data analysis are presented in sections 3 and 4. We conclude our paper with discussion in section 5.

2 LITERATURE REVIEW

Sentiment analysis is a complicated task. To begin with, we need to specify the documents that will be analyzed, their location and the time frame. One popular source of text/documents has been twitter. Tweets have been analyzed for finding out the mood and emotions of public (Bollen et al; 2011). Tweets over a time period have been extensively analyzed for predicting election results (O'Connor et al, 2010; Tumasjan et al, 2010). One can also find out if a party is being abused on social media. Some of these

attempts have been critically evaluated and the conclusion seems to be that election is a complex phenomenon and limited social media cannot predict the results (Gayo-Avello, 2012; Skoric et al, 2012). For one, not everyone uses social media and not everything that is said on social media is trustworthy (Castillo, 2011; Eni and Panagiotis, 2010). It involves classifying sentiments into positive, negative, neutral or tension, depression, anger, vigor, fatigue, confusion or a user defined category. Analyst can provide a labeled list of words for each sentiment or can augment the default list of the words if one exists (Ratkiewicz, 2011). There are many such lists in existence in public domain that come without any guarantee of being correct and one easily find errors in the correspondence of sentiment and the word list (Goncalves et al, 2013). One may use sentiment analysis to discover the sentiments of the voters if not to predict the outcome of the elections. Such an analysis can be done using a supervised machine learning technique provided labeled data is available. Machine-learning techniques complimented with real time ETL capability (Extract, Transform, Load) can adapt its classification model according to new data and based on its performance (Pang and Lee, 2008). It has been shown that combining methods gives better performance than a single method. Watson from IBM provides a sentiment analysis application using its cloud-based platform including ETL capability. Watson has deep natural language processing capability. For example, "I am not only happy, I am also also thrilled" will be categorized as a positive sentiment in spite of the presence of "not" because of its deep understanding of natural language.

With Watson (Pang and Lee, 2008), one doesn't have to spend time on programming or downloading the relevant content. Instead, the focus is on defining the problem statement, providing the required input, analyzing results and then repeat all three steps if required. It is a challenge to provide the required input as knowing the relevant websites, tweet tags are not simple. The results may also take some exploration before one is able to make sense and comprehend them (Pang and Lee, 2008). Sentiment analysis falls in general category of *big data analytics* as it deals with unstructured data from diverse sources referred to as variety of the data (one of three Vs: Volume, Velocity and Variety). Watson provides a dash board for visualization of data in multiple ways. In the next section, we discuss our research work in detail.

3 RESEARCH METHODOLOGY

We had assembly elections in India in five states in February 2017. We decided to work with three states namely Uttar Pradesh (UP), Uttarakhand (UK) and Goa. In India, state elections have been cast based instead of issue based, especially in UP which is the largest of three states. However, this time, it was not clear if cast based campaign will work. Indian economy has been growing at more than 6% for past 10 years now and literacy rate is over 74%. It is possible that voters are looking beyond their casts and leaders of their casts. There was a general perception about the issues that were considered important and demography of voters in support of each political party. We had two objectives:

1. Identify if issues are important and what issues for each state
2. Identify demography of voters

This information can be used to manage election campaign. As mentioned in the last section, we have used IBM Watson Analytics for Social Media (WASM) available on cloud called Bluemix. We created an account to get access to WASM which is an integrated environment for extraction, transformation, loading, analyzing and visualizing web and social media content. WASM lets you create various visualizations for insightful discoveries. WASM environment requires no coding at all which is a big-time saver. We also don't need powerful machines as WASM is on the cloud.

We created three projects under Social Media Analytics tab, one for each state. The input that WASM requires from us consists of *topics, themes, dates, languages and sources*. *Topics and themes* together form the criteria for selecting a document from the specified sources if it is in the selected language and within selected dates. In this study, the *topics* are the major political parties in each state. For example, BJP, Samajwadi Party, INC and BSP are the *topics* that we specified for UP which are the names of major political parties in UP. Likewise, we specified major political parties for Goa and UK. Right after specifying the *topics*, WASM starts participating by making suggestions as it has huge knowledge base and deep learning capability. WASM suggests words related to *topics* including hashtags, various other similar words for extracting data from the Internet.

We have the option of specifying two more fields namely *Context and Exclude keywords* which will enhance extraction of relevant data and reduce

extraction of irrelevant data from the specified Internet sources. The keywords we provide for *Context and Exclude keywords* are used to pick content from the Internet. Therefore, it is important to pick the right keywords. Natural languages, especially English, has many polysemous words; *context and exclude keywords* help in picking the intended meaning of word. *Themes* are the attributes on which *Topics* are classified and analyzed. We selected *themes* based on our own perception. There are certain global *themes* that apply to elections of all states and there are local *themes* that apply only to particular states. Some of the common *themes* across all three states are: *demonetization, development, beef and casteism*. Local *themes* for UP were *electricity, minority appeasement, Ram mandir and corruption*. We need to adjust the date to match the time frame of the event. In this study, we have looked at sentiments of last one year from the date of first day of election, from 1-01-2016 to 1-02-2017 as the elections were held in Feb 2017 to March 2017. Currently, Watson Analytics allows extracting data in seven languages namely, Arabic, English, French, German, Italian, Portuguese, Spanish. There is no Indian languages as of now.

So, we had to choose only English as the preferred language for data extraction, which means that we can only analyze data written in English and we will miss data written in regional languages. Finally, we specified the following platforms for extracting the data: *Twitter, Forums, Reviews, Facebook, Videos, and Blogs*. In the next section, we present our results and learnings.

4 RESULTS AND DISCUSSION

Millions of data/documents were extracted, transformed and loaded by WASM. We used free edition of WASM that allowed only the latest 25000 documents to be analyzed in one go. WASM creates multiple relevant visualization of the results that can be easily analyzed to gain insights. We can find out how many times each *topic* has been mentioned in the analyzed documents. A snapshot of the mentions per *topic* has been shown in Figure 1. It shows that total 16,021 documents were extracted which mention our *topics* 23,683 times. Out of those, BJP (*topic 1*) leads the Share of Voice (mention per *topic*) by a good margin closely followed SP-Congress (*topic 2*). Whereas BSP (*topic 3*) got the least Share of Voice. Hence, our first finding is as follows.

Finding 1: *Campaign managers of BJP can be sure that their party is being talked about whereas BSP needs to do something to get attention of voters*

A snapshot of share of voice of each *theme* by each *topic* is shown in Figure 2. The major *themes* that we looked at for UP elections are *beef, Ram mandir, development, demonetization, electricity, caste, corruption, law and order and minority appeasement*. Interestingly very few talked about Ram mandir and beef issue which have been hot topic for UP in the past. *Development* is the most talked about *theme*. Figure 2 reveals that BJP is associated with *demonetization, development, corruption and caste*.

Just to give a little background, BJP has not been able to win elections in UP ever. This time also, no one was expecting BJP to win elections but they got a clear majority. When we started this work, we also

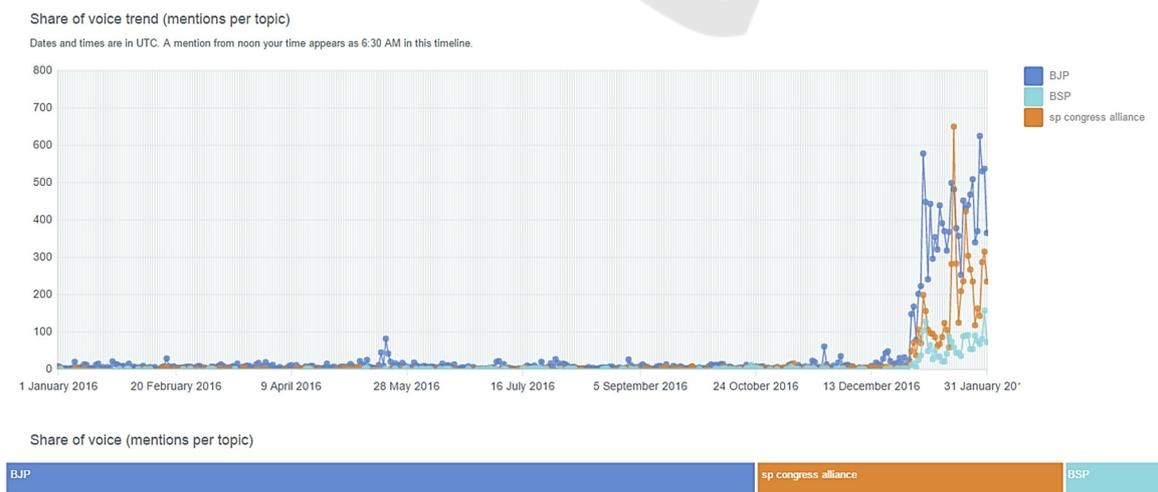


Figure 1: Share of voice for each topic.

had the same feelings but the analysis results changed our perception. From this visualization, political parties can assess what kind of association they have with various issues in the eyes of the public. Hence the following finding.

Finding 2. A political party may find out important themes and association it has with various themes in the eyes of the voters.

A natural question at this stage is: were the mentions positive or negative? Sentiment analysis answers this question in sufficient detail. Figure 3 shows share of positive, negative, ambivalent and neutral sentiments for each topic. The results in tabular form give absolute numbers (refer to Table 1). Hence the following finding.

Finding 3. A political party may find out the nature of sentiments associated with its mention.

One can also find out the media where topics are mentioned, demography of the authors and the location of these mentions as shown in Figures 4, 5 and 6.

If we look at the Twitter data in the sources tab, we will find that it is dominated by BJP. This presents an excellent opportunity for BJP to direct its election campaign efforts towards Twitter and other similar social media sites. Demography details like gender, marital and parental status gives useful insights to the political parties about the section of society which supports them and make their campaigning strategy accordingly. Hence the following findings

Finding 4. One may find out what platform is being used by voters to express their views.

Finding 5. One may find the demography of voters expressing their views.

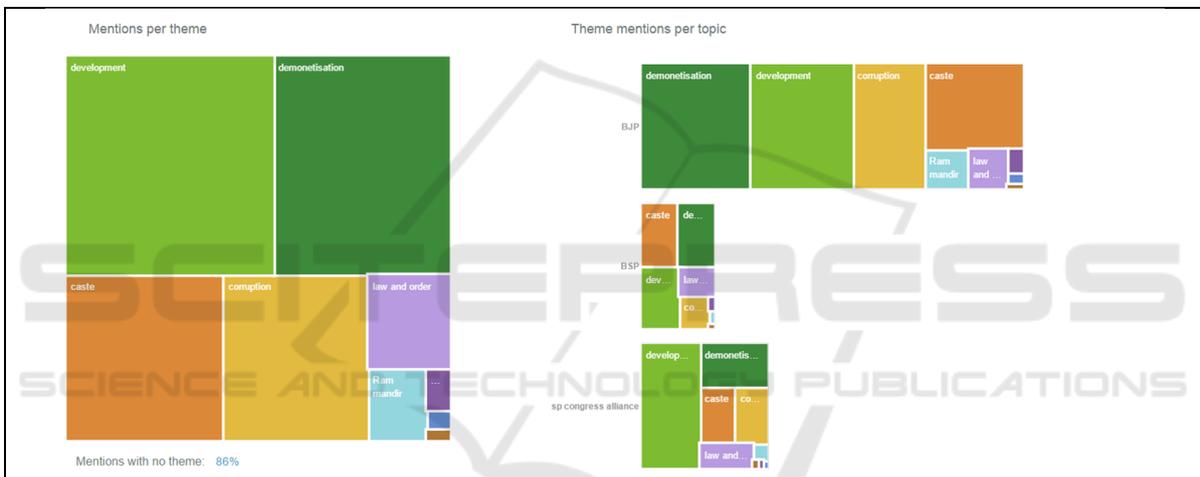


Figure 2: Mentions per theme and per topic.

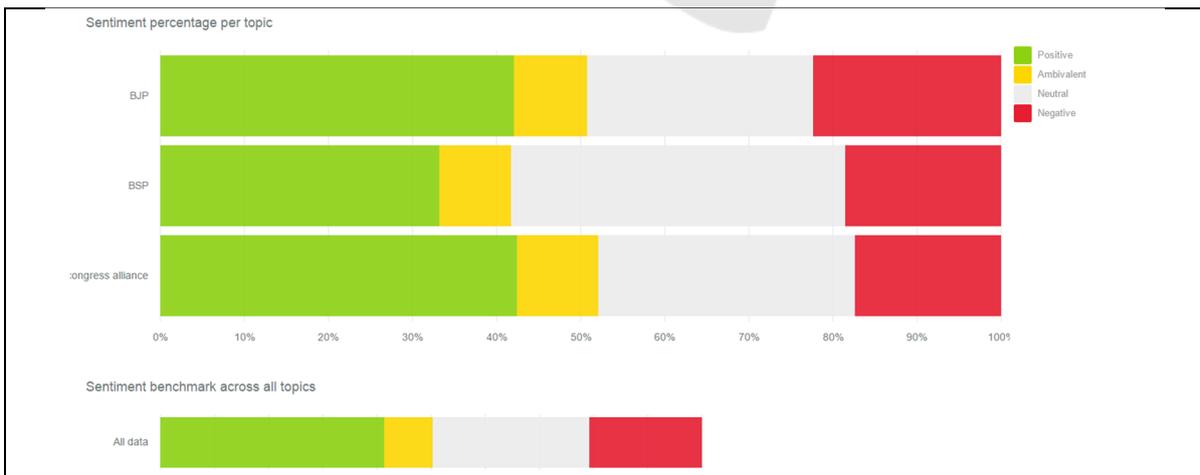


Figure 3: Sentiments for each topic for various themes.

Table 1: Results of sentiment analysis for each topic.

Topic	#Number of Mentions	Positive Sentiments (in %)	Ambivalent Sentiments (in %)	Neutral Sentiment (in %)	Negative Sentiment (in %)
BJP	15323	42	9	27	22
SP-Congress	6248	42	10	30	18
BSP	2112	33	8	40	19

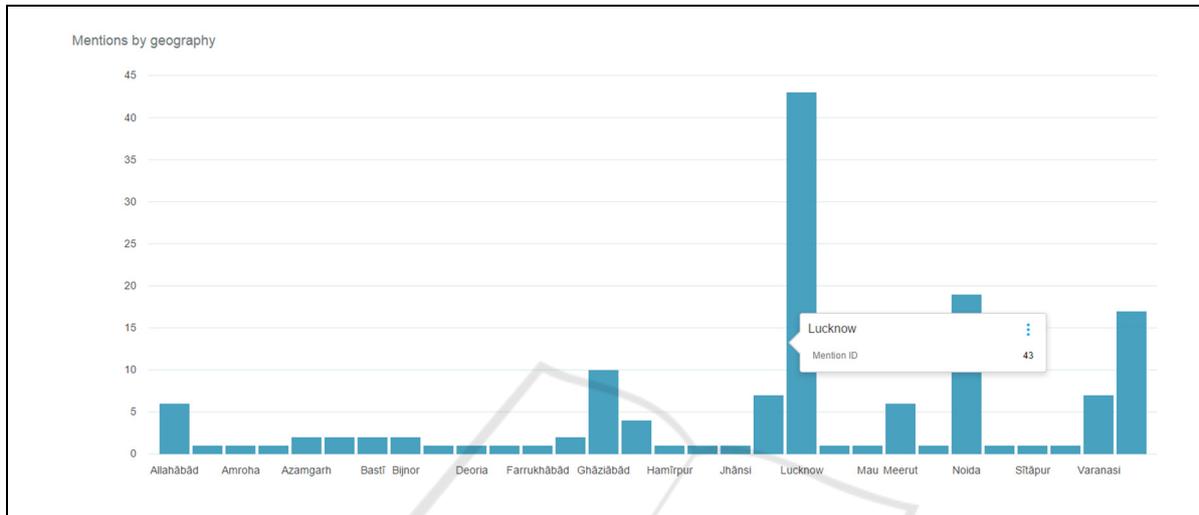


Figure 4: Mention of each topic by geography.

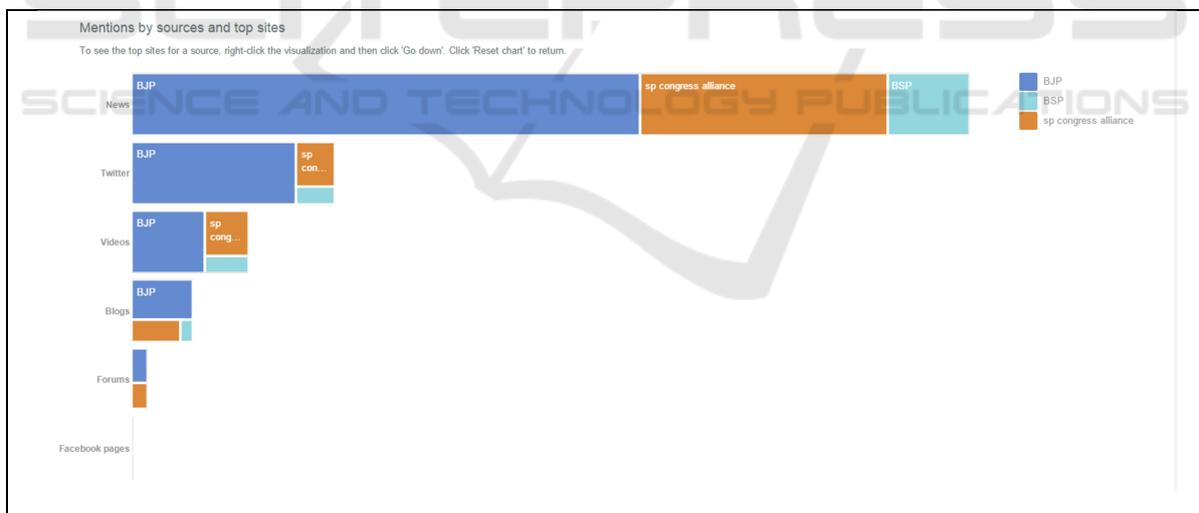


Figure 5: Sources of mention.

Findings. One may find out the location of the voters who are vocal.

Similar analysis for Goa revealed that INC leads the share of voice by huge margin and the sentiment

by far is positive. The local themes for GOA are Goan identity and culture and environment. In UK, BJP leads the share of voice and sentiment is by far positive. These results are summarized in Table 2.

Table 2: Results of sentiment analysis for each topic across three states.

Party (Major)	State: UP Winning Party: BJP		State: UK Winning Party: BJP		State: Goa Winning Party: INC	
	% mention	% positive	%mention	% positive	%mention	% positive
BJP	64	42	99	44	20	41
SP-INC alliance	26	42	-	-	-	-
INC			1	34	69	44

5 CONCLUSION

We have been able to gain useful insight in spite of the lack of support for popular Indian languages. Incidentally, BJP got a clear majority in UP and UK and INC got little less than clear majority in Goa. Without WASM, this work would not have been possible. It took us many trials before we got the right set of topics, themes, context keywords and exclude keywords. Domain knowledge plays an important role. With Internet penetration increasing exponentially in India, more and more people are getting associated with social media and taking part in online discussion. The outcomes are going to improve further in future and various agencies might integrate this methodology with poll survey to make predictions. It is no surprise that campaigns are now managed by using data and data analytics.

ACKNOWLEDGMENTS

We gratefully acknowledge contribution of IBM and its employees who helped us in getting access to WASM and provided initial training.

REFERENCES

- Ahmed, S., Jaidka, K., & Cho, J. (2016), "The 2014 Indian elections on twitter: A comparison of campaign strategies of political parties", *Telematics and Informatics*, 33(4), 1071–1087.
- Bollen, J., Mao, H. and Pepe, A. (2011), "Modeling Public Mood and Emotion: Twitter Sentiment and Socio-Economic Phenomena", *Proceedings of the Fifth International AAAI Conference on Weblogs and Social Media*, 450-453.
- Bruns, A. and Stieglitz, S. (2013). "Towards more systematic Twitter analysis: Metrics for tweeting activities", *International Journal of Social Research Methodology*, 16 (2), 91–108.
- Burnap, P., Gibson, R., Sloan, L., Southern, R., & Williams, M. (2016), "140 characters to victory?: Using Twitter to predict the UK 2015 General Election", *Electoral Studies*, 41, 230–233.
- Castillo, C., Mendoza, M. and Poblete, B. (2011), "Information Credibility on Twitter", *WWW 2011*, March 28–April 1, 2011, Hyderabad, India.
- Ceron, A., Curini, L., Iacus, S. M., & Porro, G. (2014), "Every tweet counts? How sentiment analysis of social media can improve our knowledge of citizens' political preferences with an application to Italy and France", *New Media & Society*, 16(2), 340–358.
- O'Connor, B., Balasubramanyan, R., Routledge, B.R., and Smith, N.A. (2010), From Tweets to Polls: Linking Text Sentiment to Public Opinion Time Series, In *Proceedings of the Fourth International AAAI Conference on Weblogs and Social Media*.
- Gayo-Avello, D. (2012), "I Wanted to Predict Elections with Twitter and all I got was this Lousy Paper" – a balanced survey on election prediction using Twitter data. preprint; *arXiv:12046441*.
- Gonçalves, P., Araújo, M., Benevenuto, F. and Cha, M. (2013), "Comparing and Combining Sentiment Analysis Methods", In *Proceedings of the first ACM conference on Online social networks*, 27-38, Boston, Massachusetts, USA.
- Jungherr, A. (2013, October). Tweets and votes, a special relationship: the 2009 federal election in germany. *Proceedings of the 2nd workshop on Politics, elections and data* (pp. 5–14). ACM.
- Kapoor, K. K., & Dwivedi, Y. K. (2015). Metamorphosis of Indian electoral campaigns: Modi's social media experiment. *International Journal of Indian Culture and Business Management*, 11(4), 496–516.
- Makazhanov, A., Rafiei, D., & Waqar, M. (2014). Predicting political preference of twitter users. *Social Network Analysis and Mining*, 4(1), 193.
- Mustafaraj, E. and Metaxas, P. (2010), "From Obscurity to Prominence in Minutes: Political Speech and Real-Time Search", In *Proceedings of the WebSci10: Extending the Frontiers of Society On-Line*, April 2010.
- Pang, B. and Lee, L. (2008), "Opinion Mining and Sentiment Analysis, Foundations and Trends", in *Information Retrieval*, 2(1–2), 1–135.
- Ratkiewicz, J., Conover, M., Meiss, M., Gonçalves, B., Flammini, A. and Menczer, F. (2011), "Detecting and tracking political abuse in social media", In Proc. *5th International AAAI Conference on Weblogs and Social Media (ICWSM)*.

- Rob, H. (2012), "The era of cognitive systems: An inside look at ibm watson and how it works", *IBM Corporation, Redbooks*.
- Singh, P., Sawhney, R. S., & Kahlon, K. S. (2017, November), "Forecasting the 2016 US Presidential Elections Using Sentiment Analysis", *Conference on e-Business, e-Services and e-Society* (pp. 412–423). Cham: Springer.
- Skoric, M., Poor, N., Achananuparp, P., Lim, E-P., and Jiang J. (2012), Tweets and Votes: A Study of the 2011 Singapore General Election, In *Proceedings of the 45th Hawaii International Conference on System Sciences*, 2012.
- Srivastava, R., Kumar, H., Bhatia, M. P., & Jain, S. (2015, September). Analyzing Delhi assembly election 2015 using textual content of social network. *Proceedings of the Sixth International Conference on Computer and Communication Technology 2015* (pp. 78–85).
- Tumasjan, A., Sprenger, T.O., Sandner, P.G., and Welpe, I.M. (2010), "Predicting Elections with Twitter: What 140 Characters Reveal about Political Sentiment". In *Proceedings of the Fourth International AAAI Conference on Weblogs and Social Media, 2010*

