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A Tool to Predict the Possibility of Social Unrest Using Sentiments Analysis - Case of Zimbabwe Politics 2017 - 2018

Elliot Mbunge[1], Fanwell Vheremu[2], Kinsley Kajiva[3]

[1, 2, 3] Chinhoyi University of Technology, School of Science and Engineering, Department of ICT & Electronics, Chinhoyi, Zimbabwe

Abstract: ***Due to economic, social and political conditions prevailing in Zimbabwe, researchers developed a tool to predict the possibility of having social unrest between September 2017 and August 2018 using sentiments analysis. People feel very much comfortable to express their social, economic and political views, opinions, attitudes and emotions using social media platforms such as Whatsapp, Facebook and Twitter. These social media platforms are now used by social groups to plan and spread information that lead to riotous act and mass demonstrations against the government. Researchers developed a tool to predict the possibility of having social unrest in Zimbabwe using Twitter data.***

Keywords: Sentiment analysis, social media, social unrest, elections

1. Introduction

Sentiments analysis is the analysis of people's views, attitudes, opinions and emotions towards a subject or object [1]. Sentiments analysis can be referred to as opinion mining [2]. These words are used interchangeably. Sentiment analysis is also defined as understanding an emotion or attitude of someone over a subject or object. Subject can be any topic in a particular field. Object can be individuals, occasions, and physical things. Sentiments analysis is applied to the following fields but not limited to marketing, insurance, big-data analytics, educational researches, finance sector, public health and telecommunication [3] to make decision. Social media has been the most dominant form of communication for the new millennial. The rise of social network platforms such as Facebook [4], Twitter [5] and Whatsapp [6] has further cemented the use of the internet as an additional means of communication to the already existing communication methods like mobile technology. Social networks users use social media platforms to freely express their views, opinions on particular topic or entity. There are generally three main classification of sentiments analysis namely: sentence-level, document–level and aspect-level [1]. Sentence sentiment analysis focuses on classifying texts in a sentence as either positive or negative sentiment. Document sentiment analysis classifies the whole document as either positive or negative sentiment [7]. Aspect level sentiment analysis focuses on classifying the sentiments with respect to the specific aspects of objects. The overall goal of sentiments analysis is get an understanding of the polarity and classification of certain sentiments over particular topics, thus, determining the actual attitude of people in that subject being regarded [8].

2. Background of the Study

Zimbabwe is facing harsh economic problems [9] that have affected the standard living of local citizens. Due to this economic pandemic, some people are spending for time on bank queues to access their hard earned money. Currently, Zimbabwe economy is running on multi-currency system [10] with United States of American Dollar (USD$) being with most dominant current in the circulation from 2009 to 2016 [11]. In 2017, Central Bank of Zimbabwe introduced export incentives in form of bond notes [12] to cushion cash shortage and to reward exporters. The bond notes was introduced at par with United States of American Dollar (USD$) [13]. The injection of bond notes into circulation is facing a strong resistant [14] from Zimbabwean citizens and society at large. Some supermarkets were rejecting to accept bond notes. In addition to that, some retail outlets have difference prices for the same product or item [15]. The price is determined by the mode payment and type of currency. If the customers is paying using bond notes or plastic money then the prices is slightly higher as compared when paying using USD$. Such practice is one of other contributing factors that are likely to cause instability in Zimbabwe [16].
The Republic of Zimbabwe will be having ministerial and presidential elections mid-2018. Social groups from the society are using social media to express their grievance, opinions, views, attitudes and emotions towards issues such as but not limited to inconsistent government policies [17], corruption by government officials [18], misuse of government funds [19] [20] [21], unemployment [22], abuse of office and injustices and change of electoral reforms ahead of 2018 elections [23]. Several social groups such as #Tajamuka, #Thisflag are leading protest timeline in Zimbabwe [24]. These social groups use social media platforms such as Facebook, Twitter and Whatsapp to plan demonstrations and stay-always

3. Related Work

Mahmoud [25], embarked on a research where their focus was on analyzing different sentiments form twitter during Hajji, an event gathering. The aim for this research was to get rapid and accurate feedback on the quality of service and other views during the Hajji since time and space will be limited. This analysis of twitter sentiments was carried out based solely on the English language. The sentiment analysis

system was organized into five components which carryout different processes, i.e. Processing of tweets, feature extraction, a classifier, the training dataset and the output. Although their focus was to analyze twitter sentiments, their test data was offline data. For all the data they used for this study, their results were consistent and of each word feature used, the accuracy was at least 50%.

Agarwal [26] point out that sentiment analysis over the social media like Twitter has so many levels of granularity i.e., posts that people make poses newer and different challenges for instance some tweets may come with emoji which are pictorial representation of thoughts and emotions which machines may fail to comprehend or even understand. Agarwal [26] cite that decoding some icons or emoji's has proved to be very difficult as they can be used in conjunction with words which can be made up of short hand vowels like "ar" to mean are or even "ur" which in-turn could even mean your but the context of which emoji's like this smiley face ☺ or ☺ which is marked as positive but the natural language processing may fail to actually account the actual emotion in a sarcastic situation that even the smiley face can mean a negative sentiment. According to Agrarwal [26], an attempt to make sentiment classification using natural language processing methods like Naives Bayes and Support Vector Machine which classifies terms according to term appearance frequency and even creating a Bag of Word model to convert terms to a mathematical vector that machines can process and understand unlike the human understanding.

Table 1: Table 1: Emojis classification, Agarwal [26]

Emoticons	*Polarity*
:-) :) :o) :] :3 :c)	Positive
:D C:	Extremely-Positive
:-(:(:c :[	Negative
D8 D; D= DX v.v	Extremely-Negative

The Natural Language Processing model used would include stop-words from WordNet that is part of the Natural Language Tool Kit (NLTK) which is a Python based toolkit. The stop words are used in the creation of bag of words and removal of these stop words that merely contribute much to the meaning of a sentiment but these words are there for the sake of grammar.

Rostyslav [27] used social media messaging to predict social protest by using theoretical considerations. Theoretical considerations used mobilization process where they mentioned the cognitive process which results in a human being making a decision to participate in a collective action. The other theoretical consideration was mobilization in social media which was not relevant in social media because an individual's mobilization status could only be identified if this individual voluntarily chooses to communicate it.

4. Research Objective

The purpose of the research is to develop a tool to predict the possibility of social unrest in Zimbabwe by analyzing sentiments from Twitter.

5. Computational Methodology

In this research, researchers implemented opinion mining based on fuzzy logic to enable classification of user tweets on a particular political topic in Zimbabwe. This is a feature based sentiment classification which is a multistep process which involves pre-processing phase, fuzzy score to classify each review and evaluating each sentence in the test set depending on the trained classifier.

The proposed system seeks to analyze a given collection of sentiments from twitter and come up with a sentiment polarity score based on a given topic. To be able to analyze text, researchers make use of TextBlob, a Python based text analysis library. Given a twitter phrase or sentence, we seek to return a tuple of form (polarity, subjectivity) where polarity is a float within the range [-1.0, 1.0] and subjectivity is a float within the range [0.0, 1.0] where 0.0 is very objective and 1.0 is very subjective.

5.1 Data Set

The researchers collected tweets from twiter.com for the purposes of analysis. The chosen tweets will cover random topics .From these tweets, the system search for sentiments based on topics such as Mugabe, #ThisFlag , #Tajamuka ,Mawarire and Mkwananzi which are the most popular topics of discussion in Zimbabwe political space. Tweets are processed either from a live twitter feed or from locally saved feeds.

5.2 Body Initial text mining and pre-processing

We primarily pre-process the available tweets so as to make them noise free since some tweets may describe two or more topics which makes it very difficult to detect either negativity or positivity. In addition to that, stemming was implemented to the sentences to make them match with features. This enables generation of sentences easier, automatically parsed by the TextBlob module.

5.3 Sentiments polarity and TextBlob

After the initial text mining and pre-processing is done on the tweets, each sentence is processed to calculate the polarity of the sentence associated with the topic. For example, "good" has a positivity score of 0.75 and a negativity score of 0.0. The sentences are first tokenized to check for the words which are adverbs/adjectives and nouns. Then positive tagging is applied to select Adverbs/Adjectives and Nouns.

5.4 Fuzzy classification phase

In this phase, the proposed system performs fine-grained classification of users' tweets. The tweets are classified as very positive, positive, neutral, negative, or very negative. The system classifies a new user tweet based on its fuzzy sentiment score whose computation requires three steps:

1) Identify the opinion words and the negator words if any.
2) Identify the polarity and initial value of the feature descriptors based on Senti-wordnet score [28] [29].

3) Calculate overall sentiment score using fuzzy functions to incorporate the effect of linguistic hedges.

We used the Python Textblob module(class) which takes the text tweets and returns a blob which contains the sentences and formatted into a sentence structure which when processed and provides the polarity score within the range of [-1, 1]. We then apply the min-max normalization function to map it to [0, 1]. Now, we assign a Class label vpos-very positive, vneg-very negative, pos-postive, neg-negative to each sentence based on the above states rules.

5.5 Sentence ranking method

We considered various parameters to rank the sentences so that the best sentences which describe the topic, are extracted. To rank sentences, we used the following major aspects:

1) Subjectivity
This is all about assigning a score greater than 0.75 if the sentence is too assertive and contains nouns that describe about the topic along with adjectives & without many stop words in the sentence. Thus, this helps in assigning more weight to the sentence.

2) Sentiment polarity
The ResScore, should also be considered as a variable factor, which helps in eliminating two sentences having the same overall rank at the end. Its use is not much significant but we have considered it as a useful parameter as sentence polarity also affects the weight to the sentences.

3) Determine whether the sentiment is positive, or negative.

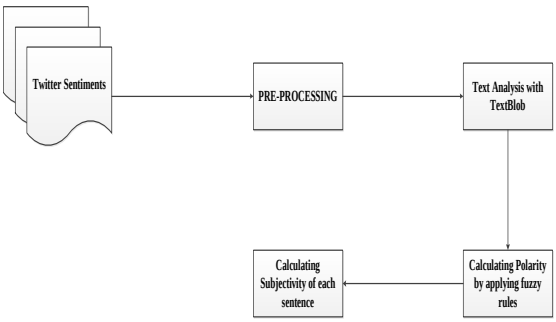

Figure 1: Twitter sentiment analysis steps

6. Results and Analysis

The researchers tested the system with various topics that are of interest to the Zimbabwean political space. The following are the results obtained for the respective topics.

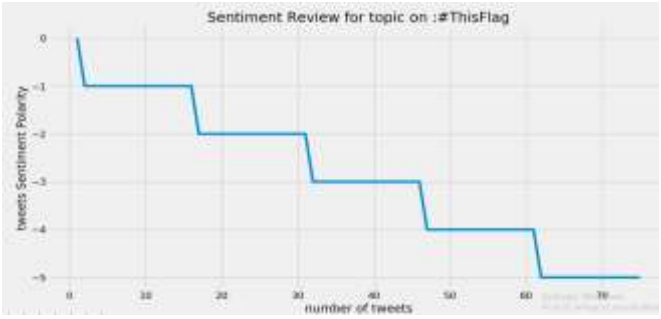

Figure 2: #ThisFlag

Figure 2 shows results of tweets that were extracted from #Thisflag social movement on Twitter –is the strongest social movement in Zimbabwe that managed to visit and demonstrate at United Nations in New York City [30]. The system extracted more than 70 tweets which have negative tweets sentiments polarity. This shows that there is high possibility of having social unrest facilitated by the #Thisflag citizens' movement between September 2017 and August 2018 in Zimbabwe. All the tweets are of negative sentiments which might trigger socio-economic and political instability in Zimbabwe. Words such as corruption, import ban, injustice, roadblocks, and bond notes appeared most in many tweets.

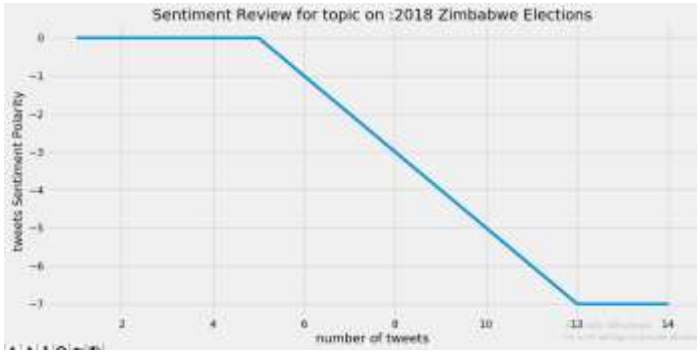

Figure 3: 2018 Zimbabwe Elections

Figure 3 shows Twitter users 'sentiments about the upcoming 2018 Presidential and Ministerial elections. From the tweets extracted, it shows that there is negative tweets polarity which means those people have riotous opinions, views and attitude towards the proceedings and registration process of upcoming Presidential and Ministerial elections 2018. From the tweets extracted, it shows that majority of people are calling for electoral reforms and transparent on Biometric Voter Registration (BVR) System before the election. The negative sentiment polarity concerning 2018 election shows that there is likely high risk of having political unrest from both political parties and social movement between September 2017 and August 2018.

7. Conclusion

People's attitudes, views, opinions, moods and emotions towards a subject or object changes over time. It is very difficult to guarantee that people's views, opinions of people would not change over a specific period of time. However, sentiment analysis or opinion mining can be used as a tool to

predict people's behaviour and come up with mitigation plan. Sentiments analysis can be used in but not limited to marketing, insurance, politics, education sector, public health and sports.

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Author Profile

Elliot Mbunge finished Bsc in Information Technology with Chinhoyi University of Technology and Msc in Information Systems with Midlands State University in 2013 and 2016, respectively.

Fanwell Vheremu and **Kinsley Kajiva** are studying Bsc in Information Technology with Chinhoyi University of Technology.