THE AWARENESS OF ENVIRONMENT CONSERVATION BASED ON OPINION DATA MINING FROM SOCIAL MEDIA

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*Corresponding Author, Received: 20 Dec. 2018, Revised: 23 Jan. 2019, Accepted: 06 Feb. 2019

ABSTRACT: Social media has become an important role in society and people widely use social media platforms to express and criticize their opinion. With the previous studies, there is much research to develop and harvest information and knowledge from social media data for decision making and prediction. The awareness of environmental conservation has become a significant issue nowadays and building and raising environmental awareness is to conserve and protect nature for the benefits of humans. Opinion mining is one of text mining approaches to assess the attitude in a given subject and the attitude may be positive or negative opinion. The paper proposes to conduct social media opinion mining in case of the awareness of environment conservation of Thai people. This study shows that social media effects to build and raise the awareness of environment protection and furthermore this research can apply to other fields and industries aspects as well.

Keywords: Sentiment analysis, Opinion mining, Awareness, Environment conservation, Social media

1. INTRODUCTION

Urban growth in all regions of the world is undeniable, especially in capital cities or economy cities, and the growth of the city means the movement of a large group of people who come together to pursue a career and live. This situation causes enormous consumption and environmental degradation. The environmental crisis is one of the major problems in the world that affects the viability of the most biological systems in the future. Therefore, the requirement to quickly resolve environmental degradation problem is essential to cultivate good moral traits in environmental awareness. Environment awareness is the foundation of the psychology to acknowledge the human actions that cause to deteriorate environment and the result will get back to destroy human life.

Nowadays, social media are increasingly used to disseminate information and express everyone’s opinion to an online society where users can communicate and convey their attitude through the social network. Social media has become a new digital medium that has played a significant role in the rapidly changing society in terms of being part of the current news media process. When the internet technology is growing by leaps and bounds, social media takes an action to be a channel for news media and effects the digital economy of the country. There are many kinds of social media platforms according to the purpose of using as following [1]: social networking (Facebook, LinkedIn, Google+), microblogging (Twitter, Tumblr), photo sharing (Instagram, Snapchat, Pinterest), and video sharing (YouTube, Facebook Live, Periscope, Vimeo). Social media becomes a vital part of everyday life and the number of social users has rapidly increased to reach 3.196 billion, up 13 percent year-on-year [2]. Therefore, the use of social media to disseminate information is a new phenomenon of Thai social life and it has an influence on people’s behavior and decision making in various fields.

Also, the trend of using online media is likely at a rapid pace and the influence of user-generated content plays an increasingly important role to impact on people’s behavior because user generates content is more reliable and generates faster and stronger streams. The power of social movement through online media acts as the communication mechanisms to interact and integrate online community for driving the purpose of social issues in Thai society.

Opinion mining is one of text mining approaches to assess the attitude in a given subject and the attitude may be positive or negative opinion and sentiment analysis is the analysis of emotions and feelings from the text to express the feelings of people such as positive feelings or negative feeling. The information of people think has always been a crucial part to influence decision making. Social media sentiment helps to understand the perceived positive or negative mood what people post on social media This research proposes to conduct social media opinion mining in case of the awareness of environment conservation of Thai people to understand and perceive the feeling of the awareness of environment conservation of Thai people.
2. RELATED WORKS

A literature review of relevant researches for exploration and adaptation information shows that sentiment analysis is the instrument to understand what people think and what feeling they are. It amalgamates with many other fields like natural language processing, statistics, and text analysis to extract the emotional feeling from the text. According to Pak and Paroubek [3], a corpus from the research was collected from Twitter to analyze linguistic sentiment analysis in the English language. Tweets from twitter were analyzed to classify users' categorization in news, politics, and culture [4]. Bollen et al. [5] investigated the tweets posted on Dow Jones Industrial Average (DJIA) to measure positive vs. negative mood and Google-Profile of Mood States (GPOMS) by using Self-Organizing and Fuzzy Neural Network and the result shown that the mood states will directly affect investment decisions and the stock market. Facebook posts were performed on sentiment analysis to measure data available to public domain [6]. The comments of fan page Facebook and tweet of Twitter were classified into some categories, positive, negative, and neutral sentiment by using TF-IDF in Indonesia; Gojek, Grab, and Uber and the results indicate that the comments on social media have evaluated the performance of these business transports online [7]. Barbosa et al. [8] propose a method to identify sentiments from tweets and the data sources were provided by labels to solve different bias. The social media analytics engine, by employed fuzzy similarity-based classification method, was proposed to automatically classify text into sentiment categories (positive, negative, neutral and mixed) and it is able to collect, filter, classify, and analyze social media text data and describes and predicts analytic information on dashboard [9]. Also, explained extends six emotions on new smart services over mobile devices, the approach is used emotional dictionaries and considers linguistic parameters to identify results [10].

There are several approaches proposed to extract information from social media and it can be classified to 2 main techniques as follows: statistical technique and machine learning technique. Linear discriminant analysis (LDA), one of the statistical techniques, was applied to explore the relationship between Facebook fan pages and visitor engagements of the exhibitions [11] and logistic regression was used to analyze textual data from social [12]. Machine Learning was applied to extract information from text data and for example, Gurkhe et al. [13] implemented the machine extracted the polarity (positive, negative or neutral) of social media data set by using naive Bayesian technique. With the advanced technologies, the enhancement of this research is continually moving forward to widespread in various other fields.

3. RESEARCH METHODOLOGIES

This section describes how to conduct this research and the methodologies applied in this project as follows: Data preparation; Feature extraction; Model Building and Testing and Evaluation.

3.1 Data Preparation

In the first stage, data were collected from social media and internet websites and they were posted to express the opinion about environment conservation.

Fig.1 Example of selected Thai hashtags

<table>
<thead>
<tr>
<th>The example of the hashtag data</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>ประเทศไทย</td>
<td>Love global</td>
</tr>
<tr>
<td>สิ่งแวดล้อม</td>
<td>Global Warming</td>
</tr>
<tr>
<td>รถจักรยานยนต์</td>
<td>Power saving</td>
</tr>
<tr>
<td>ผ้าม่าน</td>
<td>Save the environment</td>
</tr>
<tr>
<td>ถุงกระดาษ</td>
<td>Recyclable waste</td>
</tr>
<tr>
<td>สองหูสองตา</td>
<td>To Plant a Tree</td>
</tr>
<tr>
<td>เพลาทะเล</td>
<td>Waste sorting</td>
</tr>
<tr>
<td>ลูกสัตว์ป่า</td>
<td>Energy conservation</td>
</tr>
<tr>
<td>ชุมนุมเยาวชน</td>
<td>Reduce Urban Heat</td>
</tr>
<tr>
<td>ประทุษข้าวผัด</td>
<td>Forest Conservation</td>
</tr>
</tbody>
</table>

The researcher collected tweets via the Twitter API and Tweepy API [14] is used to retrieve the tweets and data, like Twitter, hashtag, created tweet time, tweet text, and retweet count was stored in the database. Some selected Thai hashtags were presented in Table 1.

Table 1 The example of data stored as a CSV file

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>user_ID</td>
<td>identifier of the user</td>
</tr>
<tr>
<td>screen_Name</td>
<td>Name of user</td>
</tr>
<tr>
<td>favorite_count</td>
<td>the number of favorites</td>
</tr>
<tr>
<td>retweet_count</td>
<td>the number of retweets</td>
</tr>
<tr>
<td>location</td>
<td>location of the user</td>
</tr>
<tr>
<td>created_text</td>
<td>the date of creation</td>
</tr>
<tr>
<td>hashtag</td>
<td>type of metadata tag</td>
</tr>
<tr>
<td>message</td>
<td>the text of the tweet</td>
</tr>
</tbody>
</table>
The information collected from the tweet was grouped to be 2 parts: the details of the users and the details of the message and data were stored as a CSV file as shown in Table 1.

The second type of data source is news and related websites related to the concept of environmental conservation. Data is the text format that requires to be preprocessing to clean and manage data before analyzing text mining. Preprocessing step of the data set is following: removing URLs, hashtags, username, and symbols; replacing the emotion icons and correcting the spelling words and checking the profanity in tweets. However, the Thai language is different from English because it’s no marks or symbols to indicate the scope of each word or sentence. Also, there are many different and specific forms of word patterns. Therefore, it is difficult to check and manage the collected information and the next section will explain to handle the collected input data.

Figure 1 was shown the system overview and data was collected from the tweeter and related websites. LEXITRON Corpus was used to analyze words and meaning of words [15]. This research was specified domain in the awareness of environment conservation of Thai people collected data from similar related information.

### 3.2 Feature Selection

Feature Selection is the reduction of data size by reducing the original data size and losing key features using the selection technique. This process of extracting comments is to pull out the feature of the comment to determine what features use this project. A Thai stop word is removed and the insignificant and unmeaning words were eliminated without changing the meaning of the text. The result was presented in figure 3. For instance, the unmeaning words were a non-significant word and in the feature selection process, the feature will be cut off.

\[
W_{(f,d)} = TF_{(f,d)} \times IDF_{(f)}
\]

\[
IDF_{(f)} = \log \frac{|D|}{|DF_{(f)}|}
\]

Where \( TF_{(f,d)} \) presents the frequency of the feature \( f \) in documents \( d \) and \( W_{(f,d)} \) shows the weight of a feature \( f \) in \( d \). \(|D|\) explains the number of documents in the training data set (Training Set) and \(|DF_{(f)}|\) is the number of documents that feature \( f \) appears. \( IDF_{(f)} \) is inverse document frequency used to identify positive, negative or neutral.

Unlike TFIDF mentioned above, this study divides data into two parts, one for positive data, and one for negative. Furthermore, according to K. Ghag, K. Shah [17], SentiTFIDF was applied to this.
project to classify the positive, negative and neutral emotional mood. If the term positive is larger than the term of negative, the term is classified as positive. On the other hand, if the term of negative is larger than the term of positive, the term is classified as negative and then the set of emotional words were stored in the database to be further next process.

3.3 Model Building

This stage uses two different classification models to build the model, Naïve Bayes and Support Vector Machine (SVM). The data were divided to be 2 sets: training and testing sets with a ratio of 70:30.

Naïve Bayes classifier, based on Bayes' theorem, is one of the crucial techniques in machine learning used to many fields like customer segmentation or sentiment analysis. The Naïve Bayes estimates a probability to assume the statistical independence of each feature.

\[ P(c|x) = \frac{P(x|c)P(c)}{P(x)} \]  
\[ (3) \]

\( P(c|x) \) is the posterior probability of the attribute \( X \) that has set the label of class \( C \). \( P(x|c) \) is the likelihood that the data in class \( C \) contains attribute \( X \). \( P(c) \) is prior probability of class \( C \). \( P(x) \) is the predictor prior probability.

Support Vector Machine is the significant supervised algorithm that can solve a classification problem and the concept of SVM is to define data in the feature space and create hyperplane to separate different class labels. SVM classifier was applied to categorize text and given the excellent result [18]. According to Seyyed M. H. Dadgar et al. (2016), TF-IDF and SVM classifier was used to classify two BBC datasets and five groups of 20Newsgroup datasets and the results were likable with 97.84% and 94.93% in precision measurement [19].

3.4 Testing and Evaluation

Accuracy, recall, precision, and F-measure were used to evaluate the performance of text models [20].

\[ \text{precision} = \frac{TP}{TP+FP} \]  
\[ (4) \]

\[ \text{recall} = \frac{TP}{TP+FN} \]  
\[ (5) \]

\[ \text{Accuracy} = \frac{TP+TN}{TP+FP+FN+TN} \]  
\[ (6) \]

\[ F\text{ – measure} = \frac{2\times \text{precision}\times \text{Recall}}{\text{precision}+\text{Recall}} \]  
\[ (7) \]

Where TP represents the number of correctly classified documents (True Positive), FP is all documents retrieved (False Positive) and accuracy is the percentage of documents correctly classified, recall is the percentage of relevant documents correctly retrieved (TP) with respect to all relevant documents (TP + FN) and F-Measure has consisted of a single measure Precision (P) and Recall (R).

4. EXPERIMENT RESULTS

After preprocessing data, to label data with polarity words from the comments were applied to set train data of extracted words. Then, sentiment analysis was used to label each comment to three groups of similar comments: positive, negative and neutral based on their polarity scores. The result gained from the experiment by using Naïve Bayes classification and SVM algorithms as shown in table 2. The data from this project was collected from social network and accuracy, precision and F-measure was used to evaluate the effectiveness of classification models.

Table 2 Classification performance

<table>
<thead>
<tr>
<th></th>
<th>Accuracy</th>
<th>Precision</th>
<th>Recall</th>
<th>F-score</th>
</tr>
</thead>
<tbody>
<tr>
<td>SVM</td>
<td>80.5</td>
<td>82.5</td>
<td>85.7</td>
<td>83</td>
</tr>
<tr>
<td>Naïve bay</td>
<td>72.6</td>
<td>79.7</td>
<td>76.8</td>
<td>74.2</td>
</tr>
</tbody>
</table>

![Fig.4 The Results of Classification Performance](image)

The SVM classification model is better than Naïve bay with the accuracy of 80.5, the precision of
82.5, recall of 85.7 and f-measure of 83 as displayed in fig 4. The results show that the SVM Model is better than the Naïve bay Model. In all classification performance values of the SVM Model indicate higher than these of the Naïve bay. Also, the result when using the model shows that the model can use to detect the concept of environmental conservation and the positive awareness is more the other awareness in the number of words and the average length of Tweet’s on data set.

5. CONCLUSION

The awareness of environment conservation has currently become an important topic and to educate and implant environment awareness social media has influenced in society and people. Therefore, the sentiment analysis is the powerful approach to identify opinion, to extract opinion’s feature, to classify sentiment, and to display the results in visualization and summarization. This research describes the methods to conduct social media opinion mining in case of the awareness of environment conservation of Thai people. This approach collected data from Twitter and related websites and then it shows how to preprocess and extraction the results. The results show that social media effects to build and raise the awareness of environmental protection and furthermore this research can apply to other fields and industries aspects as well. However, there are some errors with word wrapping and comment extraction because of the typing error and occurring of new social words.

6. ACKNOWLEDGMENTS

The authors gratefully acknowledge the financial subsidy provided by Suan Sunandha Rajabhat University.

7. REFERENCES


