

SENTIMENT ANALYSIS WITH A TEXTBLOB PACKAGE IMPLICATIONS FOR TOURISM

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ABSTRACT

This study aims to use sentiment analysis with a Textblob package for a tourism business case study in Thailand to stimulate the tourism economy post-COVID-19. Sentiment analysis is a text mining technique in a text processing field which has been an interesting research topic for many years. It is applied to gather tourism information from travellers' opinions, sentiments, emotions expressed, and attitudes in written language on social media such as review postings, forums, Twitter, blogs, and Facebook. This information is very useful to improve the service of the tourism business. We evaluate performance with Python's TextBlob package with the TripAdvisor dataset from Kaggle that contains 10,000 travellers' records. Thus, the Native Bayes model in the library is used to analyze tourism sentiments by default. The experimental results show Python's TextBlob package provides 89.32% accuracy which can vary depending on the training data and its suitability to implement for the text mining process in the tourism application.

Keywords: Sentiment Analysis, Textblob Package, Natural Language Processing (NLP), Text Mining, Tourism

INTRODUCTION

One of the major industries driving the world economy and social impact is 'Tourism' (Vetrova et al., 2018; Jermstittiparsert & Chankoson, 2019; Suanpang, Netwong & Chunhapataragu, 2021; Khan, Naseem, & Khan, 2021). Although the tourism industry contributes to high economic growth and has been practiced in several countries especially in "Thailand" which is one of the top tourist countries in the world that has beautiful natural resources, historical and high-value hospitality services (Jermstittiparsert & Chankoson, 2019; Suanpang & Jamjuntr, 2021; Suanpang et al., 2021a; Suanpang et al., 2021b). Nevertheless, in the circumstances of the COVID-19 pandemic crisis which has impacted the travel tourism industry around the world as well as social and economic, particularly in the developing world (Jamal & Higham, 2021; Skare et al., 2020; Suanpang & Jamjuntr, 2021b; Narmadha & Anuradha, 2021; Sorooshian, Azizan & Ismail, 2021). Currently, based on a report by United Nations World Tourism Organisation (UNWTO) the global inbound and outbound disbursement was forecasted to drop by 60–80% due to travel restrictions imposed by many countries which have impacted the key players in the global tourism economy and affected other small countries that rely on International tourism (Noorashid & Chin, 2021). Thailand has also been directly affected by the COVID-19 pandemic, leading to International tourist arrivals being currently prohibited. (Suanpang & Jamjuntr, 2021a) "Phuket SandBox" and "Samui Plus" were created to promote a tourism campaign to stimulate tourism. However, the study of Suanpang and Jamjuntr (2021b) who forecast tourism business recovery from COVID-19 by using deep learning methods, found that the tourism business will recover from the COVID-19 pandemic in 2024. With this prediction, the tourism industry must adapt to build healthcare safety and tourist's confidence from COVID-19 to create a new normal and next normal for post-COVID-

19. In the meantime, selecting short trips changes the tourist's behavior and drives them to unseen tourist attractions, less crowded and more personal travel (TNN 16, 2021). The smart tourism system changes tourist behavior to search for information for creating travel plans in areas that avoid crowded places which can affect outdoor activities, increasing, and accelerating the use of digital transformation (OECD, 2020; Suanpang, Netwong & Chunhapatragu, 2021).

With the advance of information technology in the digital era, the information technology in tourism destination management and tourism planning, especially post COVID 19, tourists require information to support decision making to travel to safe destinations (Flores-Ruiz et al, 2021). Therefore, several social media platforms and websites are the main resources used to extract people experiences about the places they visit for research (Gräbner et al., 2012; Tisdell, 2017). Moreover, social media has been changing the way of travelling that can also influence both the pre and post-travel phase for sharing travel experience which are factors influencing decision making including looking for adventure, new destinations, entertainment, and leisure are the most common sources of information for obtaining inspiration (Flores-Ruiz et al, 2021). From the above motivations, while many scholars have examined various tourist's feedback towards products and services, this paper deals with one of the major applications of Natural Language Processing (NLP) such as "Sentiment Analysis" in tourism reviews from the travel website 'TripAdvisor' and performs sentiment analysis using the TextBlob package which is available in Python.

The sentiment analysis is implemented in tourism order to explore the visitors' experience towards the places and services visited. The review of the literature found nine works that mentioned the idea of using sentiment analysis in tourism using the TextBlob package to perform sentiment analysis. TextBlob package is a Python open-source Python package that makes it easy to perform fundamental NLP tasks like tokenization, noun phrase extraction, classification and more. The TextBlob package is built on top of the NLP Python library. It is widely used for NLP development. The TextBlob package is easy to install by using the command "pip install textblob" in the command prompt and also it is easy to use by the same method.

This study aims to use sentiment analysis with the TextBlob package implication for a tourism case study in Thailand. The rest of this paper is organized as follows: Section 2 presents a review of the literature and related to theoretical of this research. In section 3, presents research methodology. The next, section 4 shows experimental results. Finally, conclusion and discussion are presented in Section 5.

LITERATURE REVIEW

There are many literatures related to the theoretical of this study (Salamzadeh, 2020). as following:

Social Media in Tourism

Social Media is an online platform that allows users to create, share and exchange content in social networks (LinkedIn and Facebook), blogs (WordPress and Blogger), blogs (Twitter), social news, (Digg), share media (YouTube and Instagram), question and answer (Ask.com) and review sites (TripAdvisor) (Flores-Ruiz et al, 2021; Martinez & Toral, 2019). Currently, social media is rapidly growing particularly using marketing channels to generate content (text, images, videos, etc.) and interactions between users. There are two types of information available on social media which is large volumes of unstructured, dynamic content (Flores-Ruiz et al, 2021). With the abundant content on social media, it requires to be analyzed to generate information and knowledge. There are several types of social media used in tourism, one of the most popular for

reviewing is ‘TripAdvisor which more than 77% of the comments left by former guests at hotels which are checked by potential customers considering staying before booking (Criado, Pastor & Villodre, 2018; Flores-Ruiz et al, 2021). Moreover, social media is becoming a great tool for creating influencers that allow users to share content about the quality of services of hotels and restaurants. This is leading to using ‘Sentiment Analysis’ or data mining analysis for subjects, evaluations, individuals, events, services, opinions, appraisals of products, attributes, feelings, emotions, and organizations. Flores-Ruiz et al, 2021).

Sentiment Analysis in Tourism

According, Bigne et al., (2021) who studied deep learning of sentiment analysis, pictorial content and reviewer expertise for mature destinations. The database was 2023 comments posted on TripAdvisor about two iconic Venetian cultural attractions in English. Ray, Garain & Sarkar (2021) studied the hotel recommender system by applying sentiment analysis and aspect categorization of hotel comments for finding a suitable hotel based on requirements and affordability of tourists. They experimented by trawling the hotel review dataset from TripAdvisor in the English language and applied the BERT Model. Feizollah et al., (2021) studied sentiment analysis in Halal tourism tweets on social media using the topic modelling approach. Paolanti et al. (2021) studied tourism destination management using sentiment analysis and geolocation information by using a tweeter dataset and a deep learning approach. Sontayasara et al., (2021) studied Twitter sentiment analysis of tourism during the COVID-19 pandemic using a support vector machine algorithm. In addition, Cabañero et al., (2020) studied the sentiment analysis of Twitter in tourism destinations. Liu et al., (2019) applied a sentiment analysis model to capture Chinese tourists' evaluations of destinations in Australia. Nevertheless, Gao, Hao & Fu (2015) addressed the studying of different sentiment analysis methods and compared their performance when they are used to classify texts in tourism.

As mentioned in the above reviews, sentiment analysis is often used to evaluate visitors' opinions towards the places and services visited in different situations. Social media and tourism websites are the main data sources especially Twitter and TripAdvisor in English and Chinese languages. Furthermore, many scholars studied the comparison of several machine learning techniques to improve the performance of sentiment classification in the tourism domain. This paper deals with one of the major applications of NLP i.e., sentiment analysis in tourism reviews from the travel website ‘TripAdvisor’ and performs sentiment analysis using the TextBlob package which is available in python. To study the probability of applying the Textblob package to the tourism sentiment analysis.

METHODS

In this research, we use a TextBlob package to perform sentiment analysis. The TextBlob package is a Python open-source package that makes it easy to perform fundamental NLP tasks like tokenization, noun phrase extraction, classification and more. The TextBlob package is built on top of the NLP Python library. It is widely used for NLP development. The TextBlob package is easy to install by using the command “pip install textblob” in the command prompt and also it is easy to use by the call method. Natural languages are analyzed by NPL on different layers which are from simple segmentation of textual information to complex segmentation of textual information.

```
blob = TextBlob("Thailand is wonderful where I like to live there")
result = blob.sentiment
```

print(result)

Result: Sentiment (polarity=0.42383333333333334, subjectivity=0.5126666666666667)

Sentiment Analysis in Python with a TextBlob package

The algorithms of sentiment analysis mostly focus on defining attitudes, emotions, and even opinions. in a corpus of texts. The TextBlob package is applied to analyze sentiment that requires training words. These texts can be downloaded from NLTK. Moreover, sentiments are considered based on semantic relations and the frequency of use of each text in an input sentence can affect the accuracy of the output as a result. This model is trained by the input text and can obtain the sentiment scores in the form of polarity and subjectivity that can identify input text. The TextBlob package can provide polarity from input text which is a value within the range [-1.0, 1.0] where a negative polarity is -1.0 and a positive is 1.0. This score can also be equal to 0, which stands for a neutral evaluation of a statement which means that the content does not contain any words from the training dataset. Whereas the Text Blob package can provide subjectivity/objectivity identification which is a value within the range [0.0, 1.0] where 0.0 is a very objective sentence and 1.0 is very subjective.

Feature Classifier

By default, the TextBlob package can provide NaiveBayesClassifiers which can indicate which words in a document are contained in the training set. The function should return a dictionary of features for the document. The Naive Bayes model is easy to implement and is used effectively for very large amounts of data. Naive Bayes is known as a highly sophisticated classification method. Bayes theorem provides a method of calculating posterior probability $P(c|x)$ from $P(c)$, $P(x)$ and $P(x|c)$. The equation is as follows:

$$P(c|x) = \frac{P(x|c)P(c)}{P(x)}$$

Likelihood
Class Prior Probability
↓
↓
 $P(c|x)$
 $P(x|c)P(c)$
↓
↓
Posterior Probability
Predictor Prior Probability
 $P(c|X) = P(x_1|c) \times P(x_2|c) \times \dots \times P(x_n|c) \times P(c)$

Above, $P(c|x)$ is the posterior probability of class (c, target) given predictor (x, attributes). $P(c)$ is the prior probability of class. $P(x|c)$ is the likelihood which is the probability of predictor given class. $P(x)$ is the prior probability of predictor.

RESULTS

This section shows the performance of processing sentiment analysis on a text file, particularly a novel. We use the TextBlob package that applies text mining to analyze the text file from Project Gutenberg. Sentiment analysis is used for analyzing the polarity (positive or negative) of the text whose value can be -1.0 (negative) and 1.0 (positive) [-1.0, 1.0] and objectivity (objective or subjective) of the text is which can be 0.0 (objective) to 1.0 (subjective) [0.0, 1.0] of a sentence that can considered if the value of a sentence is a negative or positive opinion or if it is a fact or neural [0]. We can also use the TextBlob package to find the most used words and the number of words or other types of data such as adjectives from the text. This study uses the TextBlob package to analyze the text on a novel available on Project Gutenberg as a text file. The

results show the text summaries which are the total amount of sentences, the total amount of words, the total amount of nouns, the total amount of verbs, the total amount of adjectives, the total amount of unique words, and the amount of unique proper nouns. These words can influence the readers. We used the novel for our experiment with the title *The Prince*, by Nicolo Machiavelli, Translated by Marriott (2021), chapter 1 to chapter 12. After Text processing, the results summary is shown that, total amount of Sentences is 392, total amount of Words is 15289, total amount of Nouns is 2312. The total amount of Verbs is 2951, total amount of Adjectives is 902, total amount of Unique Words is 2827, and total amount of Unique Proper Nouns is 309.

Computational Time

We have tested the performance of computational times which are 100, 1000, 10000, 100000, 1000000 sentences on sentiment classification with the TextBlob package. The experiment was performed on an i7 Intel Notebook with Jupyter as a development tool. Time process is 0.057844, 0.55693, 5.514536, 58.22117, 548.7566 seconds respectively.

Table 1 COMPUTATIONAL TIME					
Samples	100	1000	10000	100000	1000000
Time (second)	0.057844	0.55693	5.514536	58.22117	548.7566

We used the dataset of TripAdvisor from the Kaggle website. TripAdvisor is a famous website travel company that provides information from travellers about their experiences on trips, hotels, restaurants, and activities. We imported the first 10,000 records due to limited memory. This amount of data is enough to evaluate our prediction model.

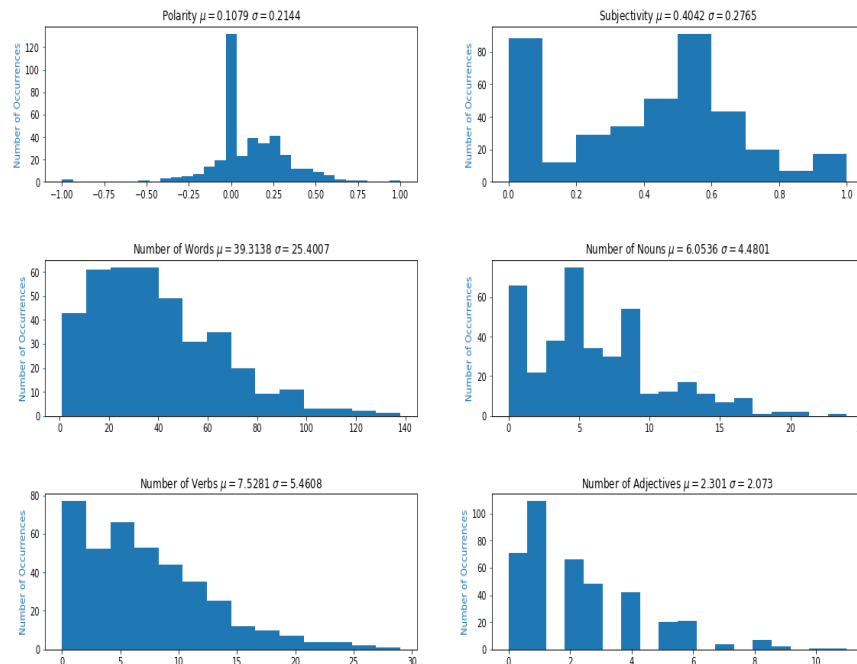


FIGURE 1
HISTOGRAM POLARITY, SUBJECTIVITY, WORDS, NOUNS, VERBS, ADJECTIVE.

Figure 2(a) shows that the reviews with high rating scores have high positive polarities which are 4 stars and 5 stars rating. In the data set of rating, Figure 2(b) shows the word cloud from the rating data set which is a visual representation of the text. Cloud creators are used to displaying very interesting words and phrases in the testing dataset based on the frequency of use, which provides more visual insights and more in-depth analyses. We found the obvious big three words which are time, room and hotel that has been used most in the testing data. The size of the text represents the frequency used in the rating data set.

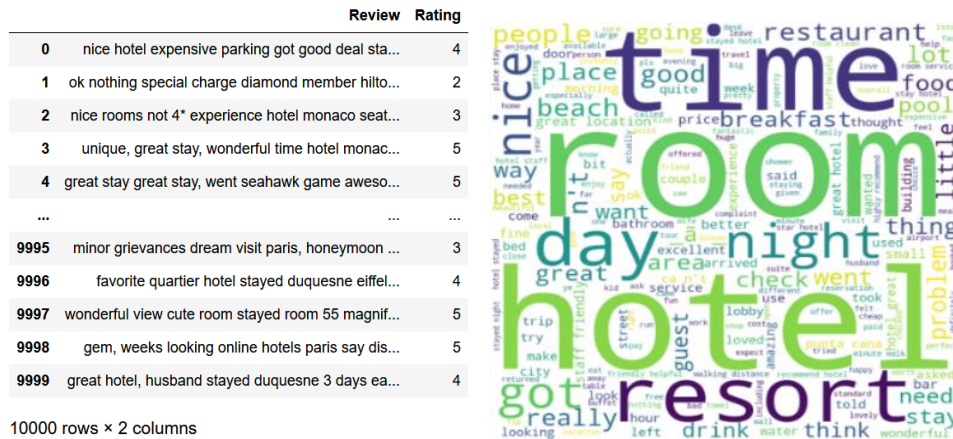


FIGURE 2

(A) SHOWS THE WORD CLOUD FROM RATING DATA
 (B) SET THE WORD CLOUD FROM RATING DATA SET

From the testing data, the first column is the identification number of the user or traveller which start from 0 to 9999 as the total amount is 10000 records. The data contains the text review about the hotels in the second column and the third column is the rating of the user for a hotel which is 1, 2, 3, 4, and 5 which stands for one star, two-stars, three-stars, four-stars, and five-stars which is the highest satisfaction. Figure 3 shows that most of the ratings are 4 stars and 5 stars and Figure 1 shows the bar plot for the rating classified groups which are 1 star, Turquoise colour, the orange colour is two stars, green colour is three stars, red colour is four stars, and purple colour is five stars.

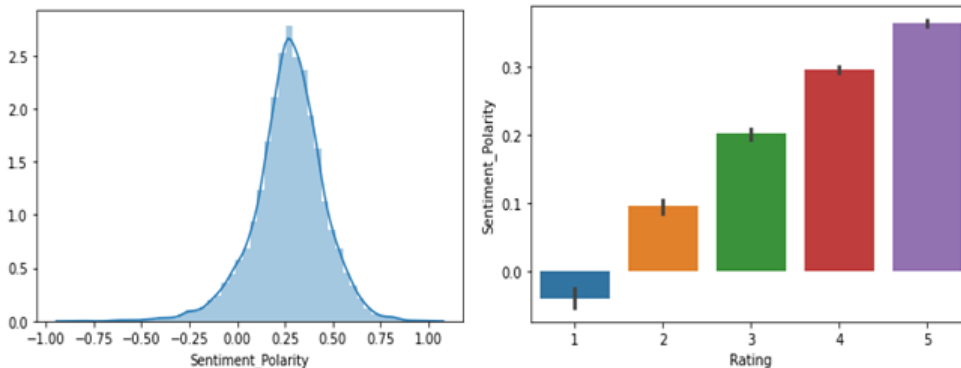


FIGURE 3

SHOWS THE AMOUNT OF THE CLASSIFIED GROUP OF FIVE RATING DATA.

Figure 3 shows that most of the reviews are positive because the graph shows the polarity between -0.25 and 0.75 and the majority of the polarity is between 0 and 0.25 which is positive. In the testing data, most of the reviews are four and five-star ratings. We can evaluate the prediction

model by measuring the accuracy in each of the five classified data sets. The results are shown in Table 2. In the 5 stars rating review data, we use our sentiment analysis model to predict the correct rating data, which was 3971, the 4 stars predicted data was 156, the 3 stars predicted data was 14, the 2 stars predicted data was 3 and the 1 star predicted data was 8 respectively. In the 4 stars rating review data, we used our sentiment model to predict the rating data where the correct predicted data is 2872, the 5 stars predicted data was 252, the 3 stars predicted data was 5, the 2 stars predicted data was 8, and the 1 star predicted data was 8 respectively. In 3 stars rating review data, we used our sentiment analysis model to predict the rating data where the correct predicted data was 845, the 5 stars predicted data was 124, the 4 stars predicted data was 125, the 2 stars predicted data was 17 and the 1 star predicted data was 3 respectively. In 2 stars rating review data, we used our sentiment analysis model to predict the rating data where the correct predicted data was 680, the 5 stars predicted data was 117, the 4 stars predicted data was 21, the 3 stars predicted data was 9 and the 1 star predicted data was 2 respectively. In the 1 star rating review data, we used our sentiment analysis model to predict the rating data where the correct predicted data was 564, the 4 stars predicted data was 156, the 5 stars predicted data was 124, the 4 stars predicted data was 37, the 3 stars predicted data was 11 and the 2 stars predicted data was 15 respectively.

Actual Data							
		5 Star	4 Star	3 Star	2 Star	1 Star	
	5 Star	3971	156	14	3	8	4152
	4 Star	252	2872	5	8	17	3154
Predicted Data	3 Star	124	125	845	17	3	1114
	2 Star	117	21	9	680	2	829
	1 Star	124	37	11	15	564	751
							10000

$$Accuracy = \frac{\text{Number of matching between Prediction Data and Actual Data}}{\text{Total Number of Data}} * 100$$

$$Accuracy = \frac{8932}{10000} * 100 = 89.32\%$$

From Table 2, we can calculate all the matching data between the predicted data and actual data in the five classified rating data sets. The accuracy of the rating reviews is 89.32%.

CONCLUSION AND DISCUSSION

Sentiment analysis one of the latest techniques for analysis social media content that using widespread that implication in tourism industry (Flores-Ruiz et al, 2021). This leading to changing the new dimension of sharing information of tourist including the pre and post-travel that tourism business uses this information for create competitive advantage and support “Next Normal” tourism after COVID-19 (Bigne et al., 2021; Flores-Ruiz et al, 2021; Khan, Naseem & Khan, 2021, Narmadha & Anuradha, 2021; Sorooshian, Azizan & Ismail, 2021). This study uses sentiment analysis with a Textblob package for a tourism case study in Thailand to stimulate the tourism economy post-COVID-19. In this study, we use the Naive Bayes algorithm for the prediction model and the data set from TripAdvisor of 10,000 records of rating reviews. The accuracy is high at

89.32 but that can vary depending on the training data. We can gain accuracy by training more grammatically correct data. However, a lot of the real data on social is the not correct grammar that can be another challenge for machine learning researchers. For our experiment, we implemented our prediction model by using Python's TextBlob library is one of the most famous and widely used natural language processing libraries. By default, we used a Native Bayes model to predict TripAdvisor data from the Kaggle website. Finally, our study shows that when we apply the Naive Bayes algorithm and Python's TextBlob library we can perform effectively for artificial intelligent tourism applications (Vetrova et al., 2018).

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