Brand reputation enhancement through data mining in social media

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Abstract. The rise of social media has provided a large range of data such as user behavior data, social relationship data and so on, which can be used for business analysis, and the use of analysis tools can obtain complex, extensive and continuously followed social media data to help enhance the reputation of brand. In this paper, the definition and potential relationship between data analysis, social media and brand reputation and how the analysis results can help enhance business reputation will be introduced. This paper uses the research methodology of review, collecting and analyzing a large amount of literature, and draws a series of effective conclusions, and concludes that data mining of social media can effectively help business analysis to expand brand reputation, indicating that data mining analysis brings a significant improvement in effectiveness of marketing activities[1].

Keywords: Data Mining, Business Analysis, Social Media, Marketing, Brand Reputation, Social Networks.

1. Introduction

The rise of social media can provide a large range of data which can be used further by analysis tools to obtain complex, extensive and continuously followed social media data. It can be helpful for business to enhance brand reputation. This paper describes how data analysis can be used to analyze social media and play a significant role in business aspects such as enhancing brand reputation. The methodologies of how data mining deal with social media is set to be explored. To draw the effective conclusions, this paper used the research methodology of review, through a systematic collection of literature and data, previous opinions and analyses are obtained and summarized. The resources used include Google Scholar, Elsevier, JSTOR and so on, which have obtained a wide range of literature and materials with the keywords of data mining, business analysis, brand reputation, etc. In this paper, data mining methods and data analysis methods relevant to business analysis are screened, extracted and summarized to ensure that the most relevant and reliable conclusions are obtained. The useful ideas collected will be used as supporting material to the analysis statement and final conclusion. By a large amount of reviewing, the value of data analysis in business is concluded and the important role of social media data is determined.

2. Data Analysis Methodologies

Data Analysis is a new and promising field, which can process data and solve problems in real life through different algorithms and methodologies[2]. Analysts can easily extract and analyze useful information from a large amount of data, which often cannot be obtained through direct observation. Not only it saves time cost, but also obtains more helpful data.

Data analysis usually find the underlying structure and peculiarity through the most basic processing of the data. The first is Descriptive Statistical Analysis, which can draw the most common average, median and other statistical indicators to summarize and describe the data. The second is Inferential Statistical Analysis, which uses hypothesis testing and confidence intervals to understand the general characteristics. Regression Analysis, such as linear regression and multiple regression, finds out the relationship between variables and the degree of mutual influence. Time Series Analysis can study the law of data change over time, get the trend and the cycle of data and so on.

The results have positive effects in many aspects and affect all levels of various professions.The most commonly used filed of data analysis results is for business and organizations, which helps enterprises, especially for customers and markets management. Social media enables enterprises to observe customers and markets more closely, playing a crucial role.

3. Data Mining Methodologies

3.1. Benefits of Data Mining

Data Mining, which is the analysis of observational data sets and find relationships and summarize data, making them to be more understandable and useful[4]. The key idea behind data mining is finding new information in a data set which can help people better understand large data set[2]. It is also known as knowledge discovery[3].

In recent years, the field of data mining has made great progress, and related technologies have been developed and promoted. Many methodologies for data mining can help data set owners to mine the new information in the data set and the result of which should play a helpful role in all aspects. The first is classification, which involves separating sets of data into groups that include a series of consistent patterns[5]. The second is discriminant analysis, which is a classification technique. Logistic regression is a generalization of linear regression. It is primarily used for predicting binary variables[5].

Large data sets can be efficiently mined for useful information using these technologies. Data mining techniques are also useful for the massive amounts of data generated by social media mentioned in this paper. Applying data mining to social media data can obtain the observation of human behavior, interaction and emotion, helping better understanding the opinion of the groups of people[2].

3.2. Data Mining in Social Media

3.2.1. Social Network Analysis. A social network includes a finite set of vertices and the relations, or ties, which are defined on them[6]. These vertices can be people, organizations or events. When analyzing the social network in social media, the network here is referred to virtual social connection on line.

To analyse the social network, first, collect the data in social media, such as user information, comment, relationships and so on, and process with them, and ensure that the data is suitable for analysis. Next, build the social network based on the data using the of vertices and edges defined by users and relationships, which can form a graph, before they are analyzed to obtain the attributes. Social network has an unique feature that it can show the community structure[6]. The community detection, path analysis visualization and influence analysis can be proceeded for the further analysis of the social network. These results can help data set owners to intuitively find out how is the organization like and how the information spreads among users. Also, by analyzing the influence of vertices, it can detect users have big influence, helping promote the product promotion.
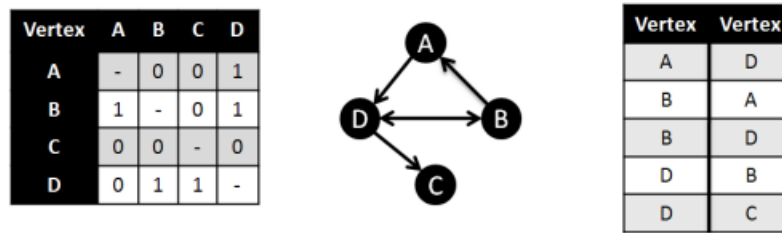
Vertex	A	B	C	D
A	-	0	0	1
B	1	-	0	1
C	0	0	-	0
D	0	1	1	-

Vertex	Vertex
A	D
B	A
B	D
D	B
D	C

Figure 1. A directed and unweighted graph G represented by means of an adjacency matrix and an adjacency list. [6]

3.2.2. User Sentiment Analysis. Public social media allows users to publish thoughts on any topic. Their opinion and comment can be shared in this simple way[7]. So, it provides a bigger amount of data set which contain users' emotion for the User Sentiment Analysis. User Sentiment Analysis is a process of computationally determining the opinions showed in users published content[7]. Those text which related to how is the users' emotional reaction to a topic and product, showing their negative, positive or neutral opinions.

There are basically two main method for User Sentiment Analysis. One is Natural Language Processing (NLP). It is often used for text mining, machine interpretation and mechanized inquiry.[8]. NLP uses basic methods to extract features in textual content while the modeling method is used to searching for topics with text elements. They help find the topic of collection data[8]. The other one is Machine Learning, which have a closer relation with data mining. Multiple Machine Learning methods are used, such as Support Vector Machine for classification and identification, Naïve Bayes as probabilistic model and N-Gram used to capture patterns of word.

3.2.3. User Behavior Analysis. The behavior users have done on social media gives the process of how users react and interact with different system, application and website, and social media is a rich and active resource of user behavior, enabling the following data-driven decision-making, and finally reputation enhancement for a business.

Various data can be collected for the user behavior analysis. Two directions are through the dimension of time and from dimension of quantity[9].The former one means that collecting and calculating the interval time of people using social media. It helps to understand user active time and user habits, as well as user engagement. This information can help optimize the timing of content release. The another one means that discussing the total number of comment, post or some other social media content from each user. This can help to obtain the the user's activity index, determine whether they are content producers and quality users, or to classify users by the amount of content they publish.

4. Reputation Enhancement Methodologies

4.1. Benefits of Reputation Enhancement

Reputation of a business company has financial value for an organization. A good reputation can bring a company only benefits. For example, it can improve the brand image, building trust between the company and customers. Second, it helps to improve the value of the company. Next, a good reputation can attract more people with ability into the company. Under the joint efforts of talents, the company will develop better. Last, it will be easier for a company with a good image to respond to any negative affair.

It also takes effort to keep all the benefits that reputation can bring, companies need reputation management. Reputation management refers to closely monitoring the harm to a company's reputation and actively formulating strategies related to reputation[10]. To achieve this, the company needs to emphasizing a positive and good brand image, reacting to negative public affair immediately and

enhancing overall reputation. And with the emergence of social media, the business company have to adapt their marketing strategies and use the data analysis result of social media as an efficient and helpful tool[10].

4.2. Reputation Enhancement in Data Mining

4.2.1. Risk Management. Risk Management is a systematic method to evaluate, analysis and monitor all kinds of risk that the organization could face with. So the purpose of risk management is to lower the influence to the goal, project and even reputation of negative risk as possible, helping reduce of the effect to reputation. Effective risk management identify the different circumstances and factors that may impact on the reputation of a company[11]. A perfect resolution of a risk event increases the public's trust in the business, improve public trust and transparency. Risk management contributes to crisis early warning. When potential crisis events and negative events that will affect reputation are discovered, preventive measures can be taken.

Due to the social media development, all kinds of information can spread very fast. In addition, reputation risk events can deteriorate a corporate reputation[12]. The upside, however, is that the growth of social media can also help companies enhance their reputations. By analyzing data sets on social media, users' comments can be collected, public opinion can be monitored in real time, and potential risks can be prepared. Secondly, to understand the satisfaction of users, analyzing data sets on social media can timely detect user-related risk problems. Finally, by analyzing discussions on the social media, the organization can understand market trends and better adapt to risks.

4.2.2. Connecting Customer Emotion. Customer Emotion Connection means building positive and deep emotion bond with customers, so that the brand can obtain benefits from this close relationship. When companies connect with customers' emotions, the benefits of it can be huge[13]. It can have a good impact for reputation. A good emotion connection allows customers to be more willing to share their experience in social media, spreading positive influence, and give the brand tolerance and trust. Emotional connection helps brand reputation both by increasing the positive impact and reducing the negative impact.

By applying data mining to detailed data sets from social media, this paper first identifies the emotional motivators for a category's most valuable customers[13]. First is to analyze data on social media to identify user preferences and interests, thereby gaining insight into user emotions and building deeper connections. Second is to monitor customer feedback in real time and respond to customer emotional expression to enhance the emotional link between the brand and customers. By analyzing trends on social media, predicting users' expectations, adjusting service and marketing strategies is also a way to meet customers' emotional needs.

4.2.3. Understanding Target Customer. Understanding Target Customers is understanding what they need and want. If a business wants to remain successful in a competitive market place, it needs to understand target customers[14]. The company can better establish an image to meet the needs of target users, enhancing the reputation of the brand.

With the advancing of Information technologies, it is able to collect and store mountains of data which can offer and diverse customer detail[15]. With this detailed profiles, business company can better finding the needs and wants of target users. Social media data mining enables enterprises to analyze target users and understand their concerns for the company. Users' interests can be analyzed, enabling businesses to create contents which are more targeted, predicting the behavior of target users by using data set from social media, responding more quickly to user needs, and subsequently increasing satisfaction and brand reputation.

5. Conclusion

To sum up, this paper studies the impact of data mining on data set from social media on brand reputation. The conclusion is drawn that the data mining of social media, such as social network analysis, user emotion analysis and user behavior analysis, can effectively help business analysis, such as risk management, understanding target user and user emotion connection, from these aspects to effectively enhance the reputation of the brand, and help the development of businesses.

There are still some limitations in this paper. First of all, other impression factors on brand reputation are not taken into account, and the impact and role of data mining cannot be comprehensively analyzed. Secondly, this paper has not found out the data mining method that helps the brand reputation the most, which means it is unable to focus on one specific method, and therefore it can not draw conclusions with more practical value. Only by understanding the role of data mining in different situations can we fully understand the role of data mining in brand reputation. Therefore, the future research direction is to combine data mining and business factors, explore the help and influence of various factors and data mining on brand reputation, and draw conclusions with direct practical value.

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