Improving Root Cause Analysis Using Fuzzy Polarity Identification and Conflict Resolution Techniques

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ABSTRACT

Identifying the root cause of feedbacks is one of the major functionalities in a marketing system. Increased use of online social networking media has automatically led to a raise in the users expressing their views in these platforms. Analyzing data from such media provides unbiased information regarding any product or service. This article presents a polarity-based root cause identification technique that identifies the root cause of a query presented by the user. The query is presented to all the available data sources, and the information returned is filtered using conflict resolution techniques. The data is then subjected to a fuzzy polarity analyzer that divides the data into groups based on their polarity levels. The data is then cross-referenced with the domain based ontology to identify the root cause.

KEYWORDS
Conflict Identification, Conflict Resolution, Fuzzy Polarity Identification, NLP, Polarity Analysis, Root Cause Analysis, TFIDF

INTRODUCTION

Increase in the availability of online services has led to an increase in the number of e-commerce and e-marketing services. Social media remains to be one of the prominent sources for obtaining marketing data. Increase in the number of social media outlets and user’s increased interest in participating in turn lead to an increase in the amount of information online (Mir & Usman, 2015). This information, when leveraged appropriately will provide better insights on marketing and requirements of the user. Social networking sites like Facebook and Twitter tend to contain huge amounts of unbiased information. Hence several established organizations have shown increased interest in analyzing this ‘wisdom of crowd’ (Wang, Zhang, Yin, Wang, Zhang, & Xu, 2016). A recent study (Mostafa, 2013) has analyzed the importance of this data and has identified four major areas where Twitter Sentiment Analysis could be used. This has also lead to the raise of new generation opinion mining and Natural Language Processing (NLP) techniques (Cambria, Rajagopal, Olsher & Das, 2013; Wang, Cambria, Liu & Hussain, 2013; Cambria, Mazzocco & Hussain, 2013) to understand text semantics. Current social media enables users to add text as well as multimedia data such as images, audio and video into the social media content. This has enabled the users to add several expressive entities to the social

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networking sites. Utilizing this information will provide a major boost in identifying better marketing strategies. In order to perform effective marketing, user’s requirements must be identified. This process is not direct, since the documents available for public marketing usage do not explicitly state the requirements. Instead, they contain only drawbacks and shortcomings of the products or services.

Need for a Root Cause Analysis System

Marketing has become a major requirement in the current competitive business environment. Information has become a major requirement in-order to perform effective marketing. Data is of paramount importance, and is the major lacking resource when considering any organization. Requirement of appropriate customer requirements has never been higher. Though the organizations have set up several input techniques for obtaining customer feedback, usage levels are low. Customers usually do not have the time and patience to identify their requirements and communicate it to the respective providers directly. However due to the evolution of social media and its huge adoption levels, most of the general public show high levels of involvements (Rathi, Shekhar, & Sharma, 2016). Discussions in such environments indirectly depict the user’s requirements or their dissatisfaction levels with a particular product or organization. Obtaining this data is not a complex task, however identifying related data from such a huge repository is complex. Improvements in the current querying techniques has reduced this complexity to a large extent. As mentioned earlier, the text contains indirect user requirements. Identifying the base causes still proves to be a challenging task.

Root Cause Analysis (RCA) is the process of problem solving to identify the root causes of a problem or fault. This factor, when identified and eliminated would solve the problem. In this paper RCA is applied not only to identify the problems or faults, but also to identify the requirements or needs of the customer. The complex social networking data is used for root cause analysis to identify the origin of a problem or a base requirement of the user. Several requirements could be identified from this data; hence, the requirements are ordered based on their levels of importance for processing.

This paper presents an architecture that can be used to effectively identify the root cause from a set of documents. It also categorizes these root causes on the basis of positive and negative polarity, hence providing the positive and negative root causes of the presented query.

The remainder of this paper is structured as follows; section II presents the related works, section III provides a detailed description of the proposed architecture, section IV presents the results and discusses them, section V presents the implications of the current research and presents use-cases for the current approach and section VI concludes the study.

RELATED WORKS

Several recent publications have been witnessed in the areas of polarity identification and conflict resolution due to the increased amount of data available online. This section discusses some of the recent and the prominent contributions of sentiment analysis and conflict identification and resolution.

An unsupervised technique to identify sentiments in tweets is presented in (Pandrarachalil, Sendhilkumar & Mahalakshmi, 2015). It uses SenticNet, SentiWordNet and SentislangNet to identify and evaluate sentiments. Sentiment score of tweets is identified by listing the words in a list of n-grams and by identifying the polarity score for each of these n-grams. Other twitter based sentiment analysis works include (Ghiassi, Skinner & Zimbra, 2013; Tan, Lee, Tang, Zhou & Li, 2011; Hu, Tang, Tang & Liu, 2013; Speriosu, Sudan, Upadhyay & Baldridge, 2011). All these methods use Tweets as their training data to identify sentiments. Machine learning based sentiment analysis has also been in prominence due to the large amount of data that can be harvested from the social networks. Some of them include (Ghiassi, Skinner & Zimbra, 2013; Hamdan, Bechet & Bellot, 2013; Montejo-Ráez, Martínez-Cámara, Martín-Valdivia & Ureña-Lópe, 2014; Zhang, Ghosh, Dekhil, Hsu & Liu, 2011). Due to the high availability and low bias nature of the data, several contributions involving cross media sentiment analysis have also increased recently. A method to fuse sentiments from text and images
Monitoring Strategies for Internet Technologies
www.igi-global.com/chapter/monitoring-strategies-internet-technologies/14556?camid=4v1a

A Collaborative Approach for Improvisation and Refinement of Requirement Prioritization Process
www.igi-global.com/article/a-collaborative-approach-for-improvisation-and-refinement-of-requirement-prioritization-process/203012?camid=4v1a