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# Customer Review for Effective Event Management Using Opinion Mining

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***Abstract:*** *This paper describes an approach for mining sentiment from customers" reviews for an Event Management company. The proffered opinion mining system mines qualitative features which are frequently commented on by customers and also classifies the sentiment orientation of the reviews. The system can generate a feature-based graphical summary of sentiment polarities. This is useful to prospective customers in making a decision regarding hire of an event management company. It is also beneficial to the company, as it helps them to improve service in requisite areas as reflected in the feature-based summary In this prospective*
***Key Word****: opinion mining, sentiment classification, natural language processing, feature extraction, event management.*

## I. Introduction

In order to stay competitive, businesses need to be responsive to customers‟ requirements and improve their services based on feedback. Most businesses nowadays facilitate feedback mechanism through website or mobile-based applications. Additionally, internet-savvy customers sometimes post their reviews on publicly available business review websites, which influence the choice of potential new customers. The customer reviews are usually in the form of concise, informally written natural language text. Mining opinion from such reviews can provide useful insights to a business and help them address specific areas to improve customer satisfaction.

Nowadays, professional event management companies are hired by companies to manage events such as conferences, trade exhibitions, product launches and award ceremonies, as well as by private individuals to manage social events such as birthdays and weddings. This paper presents a technique to perform opinion polarity mining from customer reviews for an event management company. Section 2 of the paper discusses related work in the area of opinion mining, Section 3 describes the method for mining sentiment polarity from customer reviews, Section 4 presents the results of experimentation and Section 5 concludes the paper with important observations and scope for future work

## II. Related Work

In recent years, mining of opinion from verbal or textual natural language expressions has been explored by researchers for several applications such as mining of web forum messages to predict stock returns [1], mining of political sentiment from public opinion expressed on social media [2, 3], discovering influencers or opinion leaders on a social network [4, 5], ranking of books from readers‟ reviews [6], comparison of products based on their reviews [7, 8], contextual online advertisement [9], talent management [10], classifying sentiment from movie reviews [11], various scenarios in human-agent interactions [12] etc.

Mining opinion from natural language text comprises of multiple steps including language dependent parsing, labeling of parts-of-speech (POS), identification of opinion bearing sentences and classifying the polarity of the sentiment as positive, negative or neutral [7, 8].

Various lexical tools have been developed by researchers to assist and automate these tasks. For example, parsing and parts-of-speech (POS) labeling for English language can be accomplished using parsers such as the Link Grammar Parser [13], TurboParser [14], Stanford NLP Parser [15] etc. After POS labeling, the frequently occurring nouns are usually treated as potential „features‟, while the subjective words such as adjectives, verbs and adverbs describing the features can be considered indicators of „sentiment‟ [7, 8, 16]. In order to determine the sentiment polarity of the subjective words, sentiment lexicons like the General Inquirer [17] and SentiWordNet [18] have been used in literature.

In addition to identifying the polarity of the sentiment, measuring the intensity of the sentiment expressed is also useful in some sentiment mining applications. Measuring of sentiment intensity can be done through mining of linguistic hedge terms occurring in natural language [11, 19].

## III. Methodology

This section describes the method to perform opinion mining from customer reviews. As depicted in Figure 1, the system consists of four steps: (i) Pre-processing of customer reviews to extract sentences, (ii) Detection of opinion bearing sentences, (iii) Classifying the sentiment polarity of opinion bearing sentences and (iv) Generating an opinion summary from reviews. These steps are explained in more detail next.

### 3.1. Pre-processing of Reviews

The aim of pre-processing is to process natural language review statements, so that they can be parsed. The customer reviews often contain slang terms, abbreviations, spelling mistakes and improper punctuation and other grammatical errors and hence are more difficult to process compared to formally written text [8, 20, 21].

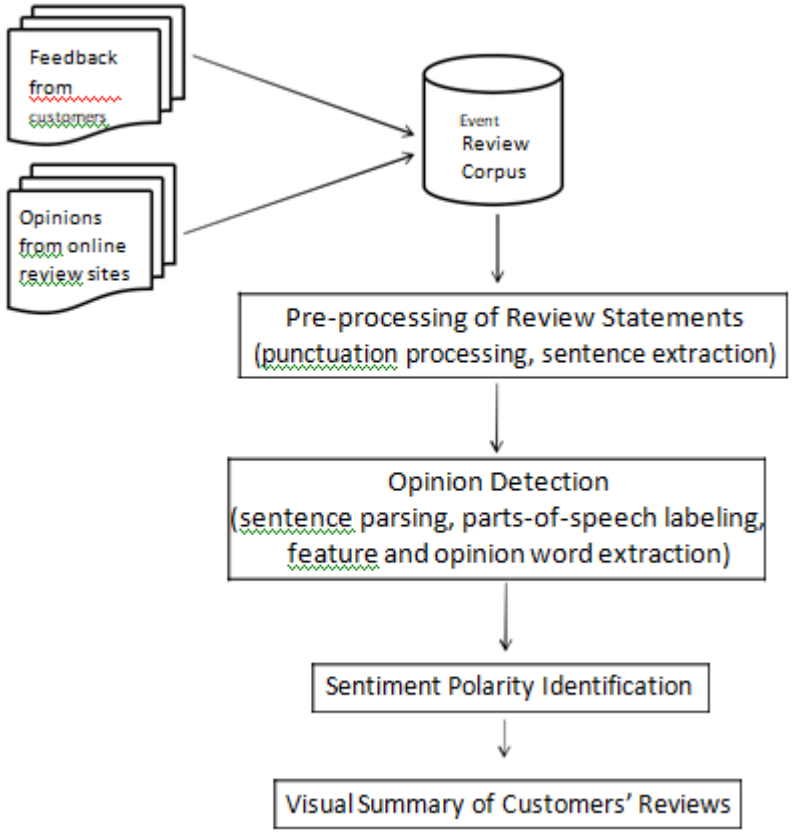


**Figure 1** Mining Sentiment Polarity from Customer Reviews

During pre-processing the sentence is first tokenized. The vocabulary of the tokens is verified by looking up a standard dictionary. Tokens which do not match standard dictionary terms are further matched against an external glossary or list prepared by human experts in order to identify as many words as possible. Moreover, since the reviews are often written in an informal fashion, some punctuations marks may be missing or repetitive. For instance, a missing full stop at the end of sentence or multiple expressions of punctuation marks like "???" or "!!" which require conflation. Thus, punctuation processing is done to detect sentence boundaries [8, 20].

### 3.2. Opinion Detection

All sentences occurring in a customer review may not be expressions of opinion. Hence, in this step the pre-processed sentences are parsed in order to detect opinion bearing sentences. The sentences which contain noun features described by adjectives or adverbs are considered as opinion bearing [7, 22].

For the simulations described in this paper, the link grammar parser was used to parse the English language sentences [13]. For instance, consider the review sentence, "The staff was truly supportive and service was efficient." This is parsed as: "The staff.n was.v truly supportive.a and service.n was.v efficient.a" using the link grammar parser. In this POS tagged sentence, ".n" indicates noun, ".v" indicates verb and ".a" indicates adjective. Here, the nouns „staff" and „service" are features of interest for which opinions are indicated by

adjectives „supportive‟ and „efficient‟ respectively. The sentiment polarity of the adjectives is determined as explained further in Section 3.3.

The proper nouns occurring in customers‟ reviews are useful in extracting information[23].From the reviews of the Event Management company it is observed that customers may refer to the same feature using synonymous words (for example, „cost/price‟, „staff/employee‟, „location/venue‟ etc). Hence, the extracted features are looked up using WordNet [24] to consolidate the occurrence of synonymous features. Consolidation of synonyms gives an accurate computation of frequency of occurrence of a feature. Further, it is observed that the customers often give opinion of the feature term „staff‟ by referring to their names. For example, "Sam and Zara were most helpful". Hence, for the simulations described in this paper, all proper nouns extracted during parsing are matched against a knowledge base comprising of employee names of the Event Management company and if a match is found, its occurrence is mapped to the feature word „staff‟.

3.3. Sentiment Polarity Identification and Summarization

In this step, the sentiment polarities of the extracted feature terms and corresponding descriptors are determined. For the experiments in this paper, the lexical resource SentiWordNet [18] has been used for tagging the polarity of the descriptive adjectives and adverbs as „positive‟ or „negative‟ based on their sentiment scores. For instance, the sentiment score for adjective efficient (PosScore: 0.5, NegScore: 0) indicates that its sentiment polarity is positive. Similarly, the sentiment score for the adjective „supportive‟ (PosScore: 0.125, NegScore: 0) indicates a positive sentiment polarity. Finally, a summary indicating aggregate positive and negative reviews of important features is graphically plotted.

## IV. Simulation and Results

This section describes the experimentation performed using the opinion mining system depicted in Figure 1, and its outcome. The corpus consists of 1500 customer reviews pertaining to event management written in English. The opining mining system performs two main tasks (i) automatically extract opinion bearing sentences from reviews and (ii) classify the sentiment polarity of the extracted review sentences.

**Table 1** Partial depiction of Mined Features and Opinion Polarities

| Sr. No. | Review Sentence | Features | Subjective descriptors | Sentiment Polarity (+/-) |
|---|---|---|---|---|
| 1. | The staff was truly supportive and service was efficient | staff<br>service | supportive<br>efficient | (+)<br>(+) |
| 2. | The staff was fantastic, food was delicious and decoration was beautiful. | staff<br>food<br>decoration | fantastic<br>delicious<br>beautiful | (+)<br>(+)<br>(+) |
| 3. | I found it to be a good company to work with. | company | good | (+) |
| 4. | Thanks! Our party was fabulous. | party | fabulous | (+) |
| 5. | The staff was very efficient and polite. | staff | efficient<br>polite | (+)<br>(+) |
| 6. | Registration was too cumbersome. | registration | cumbersome | (-) |
| 7. | I was disappointed by their marketing as turnout for the event was poor. | marketing<br>turnout | disappointed<br>poor | (-)<br>(-) |
| 8. | The dinner service was delayed and the food served was unappetizing. | service<br>food | delayed<br>unappetizing | (-)<br>(-) |

As explained in Section 3, the customer reviews are pre-processed and then parsed using the Link Grammar Parser. The noun features and the subjective words (adjectives, verbs or adverbs) describing them are extracted from the parsed sentences. Then, SentiWordNet is used to label the polarity of the „feature‟ and „subjective descriptor‟ pairs. For instance, Table 1 depicts some instances of customer reviews and their corresponding sentiment polarities. Figure 2 depicts the graphical sentiment polarity summary of positive and negative reviews for the most frequently occurring features in the reviews of the Event Management company.

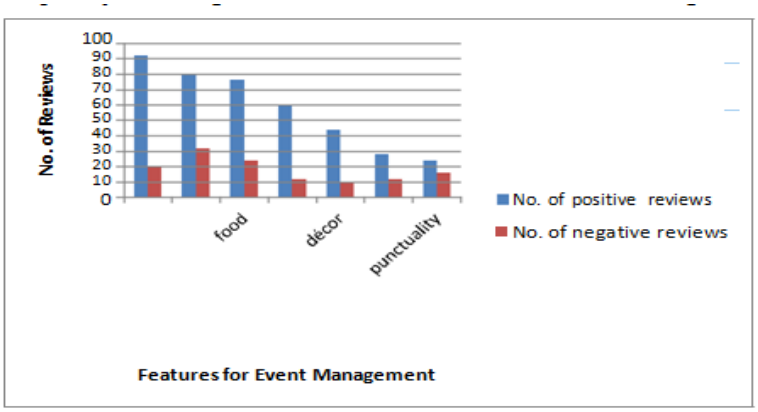


**Figure 2** Feature-based summary of sentiment polarities for Event Management

In this experiment, a sentence is regarded as opinion bearing if it contains at least one feature and corresponding descriptor word. Upon comparing with manual labeling done by human expert it is found that the opinion mining system is able to automatically extract 89% of the positive and 84% of the negative reviews. Thus, the performance of the opinion mining system at the tasks of opinion detection and polarity classification is satisfactory. It is observed that the main reasons for inability of the system to automatically identify opinion from some reviews are when the expressed opinion is either implicit, i.e. it contains no features or subjective descriptors, or when it refers to comparisons which require additional world knowledge. For example, consider the review sentence complaining about punctuality of service: "The event managers are probably from a planet where one day equals two earth weeks!" Although a human expert can identify this as a negative review, the opinion mining system could not do so automatically, since the sentence does not contain explicit mention of any features such as timeliness/punctuality.

## V. Conclusion

Event management can be improved through opinion mining of customers‟ reviews. A graphical representation of the sentiment polarities of frequently occurring features is a useful indicator of the overall performance of the event management company to new customers. The outcome of the simulations indicate that the opinion mining system described in the paper can successfully extract qualitative features from customers‟ natural language reviews and classify their sentiment polarities with good accuracy. However, the opinion mining system has the limitation that implicitly expressed sentiment is not detected. This limitation can be overcome in future by building an enhanced opinion mining system for event management that can incorporate world knowledge to detect implicitly expressed opinions, however this is a challenging task.

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