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Identifying Major Tasks from On-line Reviews

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Abstract

Many e-commerce websites allow customers to provide reviews that reflect their experiences and opinions about the business's products or services. Such published reviews potentially benefit the business's reputation, improve both current and future customers' trust in the business, and accordingly improve the business. Negative reviews can inform the merchant of issues that, when addressed, also improve the business. However, when reviews reflect negative experiences and the merchant fails to respond, the business faces potential loss of reputation, trust, and damage. We present the Sentiminder system that identifies reviews with negative sentiment, organizes them, and helps the merchant develop a plan with an end date by which issues will be addressed. In this paper we address the problem of quickly finding subtasks in a large set of reviews, which may help the merchant to identify, from the set of reviews, subtasks that need to be addressed. We do this by identifying nouns that frequently occur only in the reviews with negative sentiment.

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1. Introduction

On-line reviews can provide merchants valuable information from customers and clients about their products, service, staff, advertising and almost every aspect of their business. The information in on-line reviews potentially includes much marketing intelligence: timely knowledge of product failures and successes, awareness of the client's perception of quality of service, evidence of advertising effectiveness, and competitive pricing. Moreover, this abundant information is available immediately and free of charge. However, evidence suggests that businesses are not achieving the full potential benefit. Part of the reason for this may be the challenging task of reviewing and understanding this content. Reviews widely vary in quality and subject matter, contain biases and contradictions, and cover all aspects of the business – often mixing them together.

In this paper we consider the reviews collected by businesses in a variety of industries, including hotel service, electronic devices and cars, as provided by the Opinosis 1.0 dataset¹. From these publicly available reviews con-

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tributed by on-line customers, we organize the information to make it easier for the business owner to exploit the information. First we apply a topic mapping tool to separate the comments into a variety of subject area. Second, we apply sentiment analysis to review the general satisfaction within each subject area. Finally we use information extraction to identify the major tasks that are mentioned in the reviews, so that the business owner can decide what tasks need to be done. We provide an on-line tool called the Sentiminder that automates these steps and creates an initial schedule with an achievable end date, which the business may share with the on-line community. The end goal is to satisfy the expectations that an on-line community of current and potential customers places on the business, helping it remain competitive.

2. Related Work

Related to our work, Thomas and Atish² proposed a text mining model, enhanced using the Regression ReliefF (RReliefF) feature selection method, for predicting the helpfulness of on-line reviews from Amazon.com. Based on their outcomes, they found that RReliefF significantly outperforms two popular dimension reduction methods (BOW, LSA). This study applies text regression for predicting on-line review helpfulness and to show that analysis of the keywords selected by RReliefF reveals meaningful feature groupings.

Htay and Lynn³ proposed a new opinion mining technique in classifying reviews documents by extracting features and opinion words. Their idea is to extract patterns of features and/or opinion phrases. They used linguistic rule to extract pattern knowledge.

Somprasertsri and Lalitrojwong⁴ proposed an interesting approach on how to identify the semantic relationships between product features and opinions. The technique is used for mining product feature and opinion based on the consideration of syntactic information and semantic information. Their approach uses dependency relations and ontological knowledge with probabilistic based model.

Sánchez-Franco *et al.*⁵ propose a product feature-oriented approach to the analysis of on-line guests reviews, and analyzes the relationship between the most prominent features and guests hotel rating in the on-line travel agencies environment.

3. The Sentiminder Prototype

The *Sentiminder* is a functioning prototype, written in R/Shiny, that helps the owner of any business that needs to respond to on-line reviews.

A wide variety of issues, contributed from many customers, are presented to the Sentiminder. It uses Latent Dirichlet Allocation^{6,7}(LDA) to cluster these comments by topic.

The sentiment of each cluster is estimated using the frequency of words with positive and negative sentiment, using a method common in the literature^{8,9,10}, based on counting the number of positive and negative affect words appearing within. The degree of negative sentiment is considered to be a measure of the priority of addressing these comments. More negative sentiment is also interpreted as a larger potential benefit to the business that will arise from rectifying the issues addressed by the reviews.

These clusters with priorities are presented to the business owner, who can then consider them and interactively assign project management attributes for each task, including estimated cost, duration, earliest start date, and latest end date. The tool optimally balances cost against benefit according to the merchant's relative value of reducing cost versus increasing sentiment. The merchant also provides shared resource constraints in a straightforward way, by specifying any pair of tasks that is constrained from being performed at the same time. This would be the case, for example, if one team of people could perform two different tasks but could not do them simultaneously. The tool selects an optimal set of tasks that meets these scheduling constraints. The merchant can express an overall completion date for all tasks, and the tool then considers only schedules which can be completed within this limit. For further details please see Figure 5.

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