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Contextual Ontology Based Opinion Mining

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ABSTRACT: The Web contains a wealth of product reviews, but sifting through them is a daunting task. Context-aware systems are designed to react to the constant changes in the environment. Many users may have different needs in different situations, every individual's views and suggestions are valuable information in opinion summarization process. Though lots of views and suggestions are available for different products in websites yet we lack in most appropriate opinion for any selective product at a particular situation. In this paper Customer reviews are collected as first phase, and features of products and contextual information in the customer reviews are represented in ontology. Now opinion mining is done to determine the polarity of the product based on the context and features. So contextual ontology based opinion mining system is developed and opinion summarization is done.

KEYWORDS: Context Extraction, Ontology, Opinion mining, Opinion Summarization

I. INTRODUCTION

Opinion Mining is associated with Artificial Intelligence (AI) uses the natural language processing that is used to track the mood of the public from different sources like reviews, conversations etc... Automated opinion mining often uses machine learning to mine text for sentiment. Opinion mining, which is also called sentiment analysis, involves building a system to collect and categorize opinions about a product. Opinion mining can be useful in several ways. After opinion mining is done opinion summarization is done which can be used for the recommendation process. Recommendation process is nothing but recommending a particular product for the user based on the user's interest.

Context plays a vital role for opinion mining and opinion summarization that is used to recommend any user the most appropriate products the user wants. Context is typically the location, identity and state of people, groups and computational and physical objects. Recommendations depend on the context, it is sometimes important to know not only what to recommend to whom, but also under what conditions or circumstances affecting something. For example, in mobiles the Specific Absorption Ratio (SAR) value is related to the context information. SAR is defined as the number of signals the mobile is going to absorb while receiving a call, the signals may be high when it is in a closed room because in a closed room the antenna's do not know whether the signal has been received or not, so it continuously sends the whole multiplexed signals. The relation between the SAR value in mobiles with the context is that for every mobile the SAR value in India will be different when compared with the SAR value of other countries like Germany, USA etc.. This is a simple example for the location context likewise we can consider many contexts for many products.

Ontology defines a common vocabulary for researchers who need to share information in a domain. It includes machine-interpretable definitions of basic concepts in the domain and relations among them. Ontology is used to, (i) share common understanding of the structure of information among people or software agents (ii) enable reuse of domain knowledge (iii) make domain assumptions explicit (iv) separate domain knowledge from the operational knowledge and (v) analyze domain knowledge.

II. LITERATURE SURVEY

In the literature there are several researchers that analyze opinion and reviews to obtain consumer's information. In mining opinion, several approaches using artificial intelligence techniques and text mining address the problem of

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identifying consumer's ratings or opinion (positive or negative) for a product from consumer's reviews [1] [2]. Sentiment analysis is focused on the extraction of the relevance of product's feature based on sentiments of consumer reviews expressed in review sentences. Natural Language Processing (NLP) and supervised, unsupervised learning techniques, association rules have been used in sentiment analysis [2] [3] [4]. The sentiment classification relies with the classification of the reviews based on their polarity (positive or negative). Text mining and mutual information are used in sentiment classification [5][6] [7][8]. All of the previous approaches analyze reviews to extract product's features and classify opinions but they did not capture the context in which the reviews were expressed. In this work, we propose the use of text mining tools to obtain classification rules to identify contextual sentences containing contextual information into a review. The problem of determining whether a review or sentence express consumer's preference is not easy to solve. It is also about context information. Without such information, any preference is of little practical use. So one should not only talk about preferences extraction from consumer's reviews, but also about the context information that preferences have been expressed upon. In this work contextual information is any condition that allow identify the temporal preference of a consumer for some product feature. For example the date when the review was written, weather condition that conditioning a trip, trip objective, etc. For example a consumer might prefer cheap mobile when he travels with his family for holidays but he prefers expensive hotels when he makes business trips. So, contextual information is the objective of trip: holidays and business. This information is easier for a consumer to express in a review where he can write using free text form. Thus, we need to be able to analyze the natural language text accurately to identify and extract user's preferences and the context on which preferences have been expressed.

III. PROPOSED SYSTEM

In the literature survey it is identified that many existing systems do not consider the contextual information present in the online product reviews. So we propose a method that is based on extracting the context information from product reviews to do the opinion mining and opinion summarization is done to find the polarity of the products based on the context. For extracting context information there are two types they are content based filtering and collaborative filtering [9]. Traditional collaborative filtering methods use matrix representation of the context but in our proposed work we use ontology to represent both the product features and the context information and opinion mining is done to extract the opinions and hence opinion summarization is done to find the polarity of the products for different contexts.

Context-aware systems are designed to react to the constant changes in the environment. Many users may have different needs in different situations, every individual's views and suggestions are valuable information in opinion summarization process. Though lots of views and suggestions are available for different products in websites yet we lack in most appropriate opinion for any selective product at a particular situation. In this paper Customer reviews are collected as first phase, and features of products and contextual information in the customer reviews are represented in ontology. Now opinion mining is done to determine the polarity of the product based on the context and features. So contextual ontology based opinion mining system is developed and opinion summarization is done.

IV. HIGH LEVEL ARCHITECTURE

The figure 1 shows the typical architecture of our system

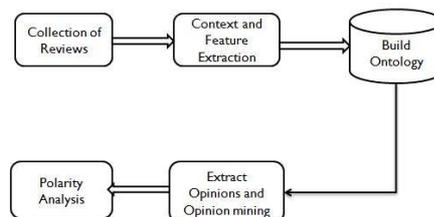


Figure 1: Architecture for Contextual Ontology Based Opinion Mining

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A. INPUT AND OUTPUT SPECIFICATION

1) Input

The input to the system is the product reviews data

2) Output

The output of the system is the polarity of the product and to recommend a particular product to the user.

B. MODULE DESCRIPTION

A. EXTRACTING CONTEXT AND FEATURES

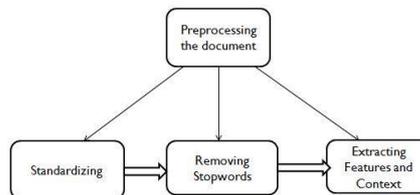


Figure 2: Extracting Context and Features

The contextual information like time, date of the reviews has to be extracted from the product Reviews. Three methods can be employed in order to provide contextual services. Figure 2 shows the typical block diagram of the preprocessing of the product reviews in the form of document for extracting the product features and context.

a) Standardizing

This Function is used to standardize the original document. The process of standardizing include removing line breaks, consecutive multiple spaces, punctuation symbols and convert the English document to lowercase letters in order to eliminate the impact of the case on the keyword extraction.

b) Removing Stop words

This function is used to remove stop words in the document, the process by reading the list of stop words, according to the list of words, the stop words in the document is removed. In addition, this step is optional, remove stop words may improve the accuracy of keyword extraction, or may not be affected.

B. ONTOLOGY REPRESENTATION

In the old method, the polarity is based on entire document. It doesn't specify which feature is important for the product so by representing them in the ontology each feature has its polarity. In general, in a sentence noun is considered as a product feature, adjective is represented as opinion and adverb as modifier.

C. OPINION MINING AND POLARITY ANALYSIS

Opinion mining is a type of natural language processing for tracking the mood of the public about a particular product. Opinion mining, sometimes also called as sentiment analysis, involves creating a system to collect and categorize opinions about a product. It can help marketers evaluate the success of an ad campaign or new product launch, understanding which versions of a product or service are popular and identify which demographics like or dislike particular product features.

Three popular algorithms for opinion mining

a) Distributional similarity

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b) PU learning

c) Bayesian Sets

After opinion mining has been done the next step is to give the customer the quality of the product, it can be done using this module. This is what actually done in polarity analysis.

Table 1: Ratings of the mobile based on context

Context	Rating
Teacher	4.16
Student	4.22
India	4.06
USA	3.16

V. CONCLUSION

The aim of this work has been to develop methods and techniques that could be used as part of contextual ontology based opinion mining system in order to provide relevant and contextualized services to users. This system helps the users to buy products based on their context.

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