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Sentimental Analysis of Consumer views on a Product using Web Mining Techniques

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***Abstract*:** In this paper we find the research reports what other people have their opinion about the particular product. With the growing availability and popularity of opinion-rich resources such as online review sites, and people can actively use information technologies to seek out and understand the opinions of others. The sudden eruption of activity in the area of sentiment analysis, which deals with the computational treatment of semantically, sentiment, and subjectivity in text, has thus occurred at least in part as a direct response to the surge of interest in new systems that deal directly with opinions as a first-class product.

We report research results investigating product review as a form of electronic word-of-mouth for sharing consumer opinions concerning brands. We analyse the product which containing branding comments, sentiments, and opinions. We investigated the overall structure (rate) of the particular product, and the movement in positive or negative sentiment. We compared automated methods of classifying sentiment of the product with manual coding. Using a case study approach, we analysed the opinion of the particular product and its rate. Our comparison of automated and manual coding showed no significant differences between the approaches. In analysing the product rate, the linguistic structure of product approximates the linguistic patterns of natural language expressions.

Keywords: *Opinion Mining, Sentiment Analysis, Semantical, Subjectivity, Linguistic Structure, Manual Coding*

I. INTRODUCTION

Opinion Mining is a good area of a subject and stays at the crossroads of Information Retrieval, Information Extraction and Web Mining. This paper will provide a basic background about the mentioned areas explore, presenting technologies and concepts which will be used throughout this work. Opinion mining is a process for tracking the mood of the public about a certain product, for example, by building a system to examine the conversations happening around it. Opinion mining can be useful in several ways. It can help marketers evaluate the success of an ad campaign or new product launch, determine which versions of a product or service are popular and identify which demographics like or dislike particular product features. For example, a review on a website might be broadly positive about a digital camera, but be specifically negative about how heavy it is. Being able to identify this kind of information in a systematic way gives the vendor a much clearer picture of public opinion than surveys or focus groups do, because the data is created by the customer. There are several challenges in opinion mining. The first is that a word that is considered to be positive in one situation may be considered negative in another situation. Take the word "long" for instance. If a customer said a laptop's battery life was long, that would be a positive opinion. If the customer said that the laptop's start-up time was long, however, that would be is a negative opinion. These differences mean that an opinion system trained to gather opinions on one type of product or product feature may not perform very well on another.

A second challenge is that people don't always express opinions the same way. Most traditional text processing relies on the fact that small differences between two pieces of text don't change the meaning very much. In opinion mining, however, *"the movie was great" is very different from "the movie was not great".*

Finally, people can be contradictory in their statements. Most reviews will have both positive and negative comments, which is somewhat manageable by analysing sentences one at a time. However, the more informal the medium (twitter tweets or blog posts for example), the more likely people are to combine different opinions in the same sentence. For example: "the movie bombed even though the lead actor rocked it" is easy for a human to understand, but more difficult for a computer to parse. Sometimes even other people have difficulty understanding what someone thought based on a short piece of text because it lacks context. For example, "That movie was as good as his last one" is entirely dependent on what the person expressing the opinion thought of the previous film.

II. LITERATURE SURVEY

From the customer perspective, considering others opinions before purchasing a product is a common behavior long before the existence of Internet. In the era of the digital world, the difference is that a customer has access to thousands of opinions, which greatly improves decision making. Basically, customers want to and the best for the lowest price. In other words, they search for products that best fulfill their needs inside a price range that they are willing to pay. It is important to emphasize that the beneath of analyzing other opinions, comes from their neutral nature, which are usually not linked to an organization or company.

They represent the voice of ordinary consumers, and that differs greatly from ads (advertisements are biased and tend to favor the product, emphasizing the positives aspects and concealing the negatives ones). From the e-commerce perspective, receiving consumer’s feedback can greatly improve its strategies in order to increase ports of the sector. For example, an online shop can place smart ads by measuring the level of satisfaction of consumers for a given product. For instance, if a product has a low level of satisfaction, a smart strategy would be placing a competitor ad inside this page.

It is common toned products with thousands of opinions, thus it could be a hard task for a customer to analyze all of them. Also, it could be a very tiresome work toned opinions about just some features from a product, usually a requirement for an experienced customer.

An important difference makes the actual ranking mechanisms not so ancient to depict the information represented by opinions. This difference is mainly due to nature of textual information in the world. These information are either facts or opinions. The actual search systems are focused on facts (e.g. ranking mechanisms used by search engine). One fact is usually equal to all other same facts. An opinion however is a belief or judgment of a subject. Therefore, one opinion from an object under discussion (OuD) is usually different from multiple opinions for the same OuD. In this sense, a summarization mechanism portraits better the reality of opinions and thus provides better ways for users to draw conclusion out of them.

This work presents ways for locating, extracting, classifying and summarizing opinions or reviews on the Internet. The proposed framework will combine several techniques to extract valuable information out of natural language text (user-generated content), in order to provide enrichment of the experience of users by taking advantage of the available content in a more intelligent and organized way. As a consequence of the employed techniques, data can be structured, this will also provide a necessary bridge for many applications to be able to fully interact with others in a Web 3.0 context.

III. OPINION MINING SYSTEM OVERVIEW

An opinion mining system proposed and has some of the following components as illustrated in figure.

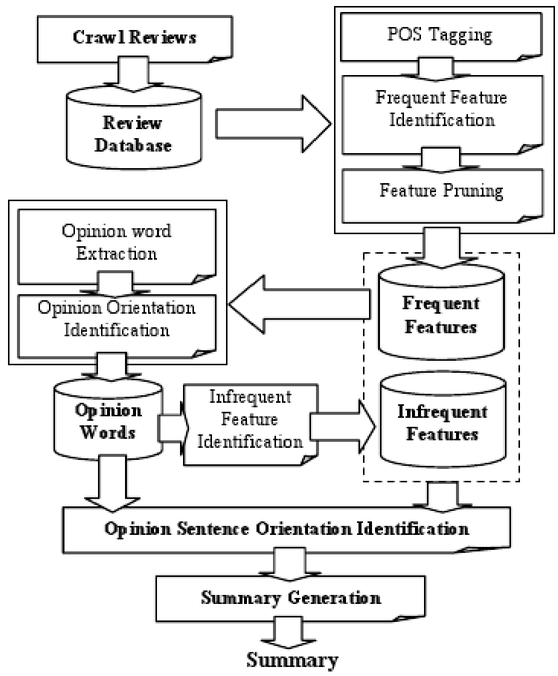


Figure 1: Architecture of an opinion mining system

The system counts with a crawling module, which first downloads all the reviews and stores them in the database. After that a POS tagger tags all the reviews which will work as hooks for the mining part responsible for finding frequent features

IV. WEB CRAWLER

Search engines rely on computer programs called Web Crawlers (also called Web robots or Web spiders), to traverse web pages by following hyperlinks and storing web documents that are later indexed to optimize the search process. A web crawler is probably the most important and complex component of an online search engine.

Web crawlers have two important issues to address: First is to use a good crawling strategy (which includes the algorithm strategy for traversing new web pages) and intelligent mechanisms to optimize the process of re-crawling. Second, because this task is computational intensive, the system must be able to deal with many di_erent scenarios under di_erent circumstances (hardware failure, server problems, errors while parsing documents) while still maximizing the work to ensure that the maximum advantage is taken out of the available resources (such as limited network bandwidth, computer memory, cpu, etc.)

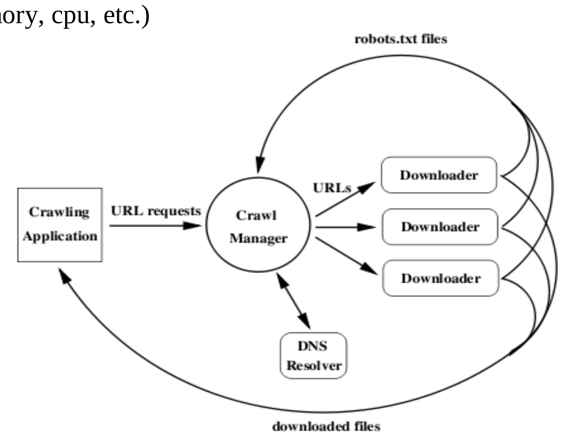


Figure 2: A web crawler system in detail

V. INFORMATION EXTRACTION

Information Extraction (IE) is a sub-discipline of artificial intelligence that aims to extract valuable information out of unstructured data. An extraction information system usually is focused on entities or objects identification (people, places, companies, etc) and extraction rules are usually but not necessarily domain special. Unstructured data can have many different forms, such as videos, images, audio and text. The first information extraction systems were mainly focused on text, and still nowadays this is the most explored type of data by the research community and commercial frameworks.

VI. RETRIEVING OPINION FROM SOURCE

Amazon provides the facility to request reviews of a product from their database through web services. Each web service call returns a maximum of five opinions. Through this service is also possible to visualize the total amount of available opinions for a given product. It is important to consider cases where hundreds or even thousands of opinion are available. For 1000 opinions for instance, a total amount of 1000/5 = 200 web services calls would be produced. This number represents a great overhead especially considering time and network limitations.

With CNET.com the overhead is far bigger when compared to the Amazon case. First, CNET provides no web service facility where the information can be retrieved using web service calls.The overhead of this technique is due to the need of requesting whole pages when just a small information, among several other useless information (advertisements, photos, videos, etc.) are necessary. Another problem already discussed, was the fact that manyweb servers may interpret a high number of HTTP GET requests in a short amount of time as an attempt of a DoS attack.

Table 1: Job description for product \Nikon P90" on CNET

Product	Source	Retrieved Opinions	Available Opinions	Base URL
Nikon P90	CNET	2	16	http://reviews.cnet.com/digital-cameras/nikon-coolpix-p90/4864-6501 7-33520041

VII. AUTOMATIC FEATURE IDENTIFICATION

Automatic feature identification is the process of automatically identifying product features from opinions, without apriori knowledge about the product under discussion. This process is also called Frequent Feature Identification" and it was introduced in due to the way features are identified in a sentence.

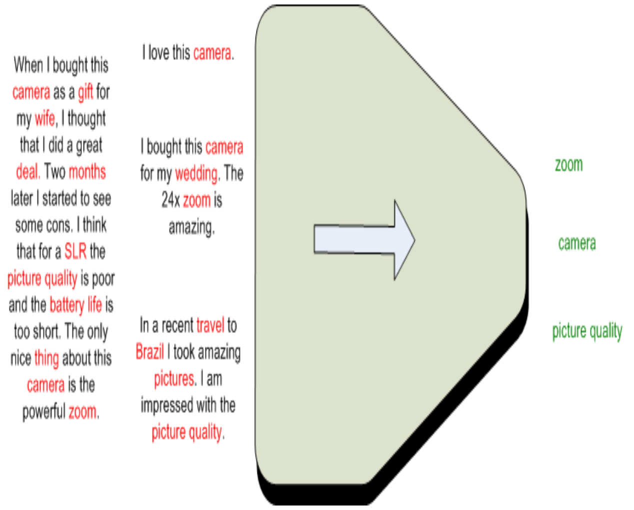


Figure 3: Representation of the Word net word orientation search algorithm

This representation of the word net orientation represents the clear picture about the particular product say an camera, Here the detail explanation or the review of the product are mentioned like good or bad about the particular product.

VIII. WORD SENTIMENT CLASSIFICATION

An opinion word by definition encodes an emotional state. Different opinion words canencode different sentiment intensity levels as studied For the sake of simplicity only discrete values are assumed for each opinion word. It can be either positive, negative or neutral (+1, -1 and 0 respectively). To end the orientation of words a bootstrap process is used to link opinion words to their orientation.

```
method WordOrientation (word, s ent enc e)
wo rd o r i ent a t i on = 0
for word w in o p i n i o n wo r d l i s t do
i f word == w
i f a p p l y n e g a t i o n r u l e s ?(word , s ent enc e )
wo rd o r i ent a t i on = (o r i e n t a t i o n o f w) * □1
el se
wo rd o r i ent a t i on = (o r i e n t a t i o n o f w)
e n d i f
e n d i f
end f o r
i f wo rd o r i ent a t i on == 0
word or ient a t i on = checkOr ientat ionInWordnet (word )
i f wo rd o r i ent a t i on != 0
i f a p p l y n e g a t i o n r u l e s ?(word , s ent enc e )
wo rd o r i ent a t i on = wo rd o r i ent a t i on * □1
e n d i f
saveWordToOpinionWordList (word )
el se
saveWordtoRes idueLi s t (word )
e n d i f
e n d i f
return wo rd o r i ent a t i on
end method
```

IX. IMPLEMENTATION

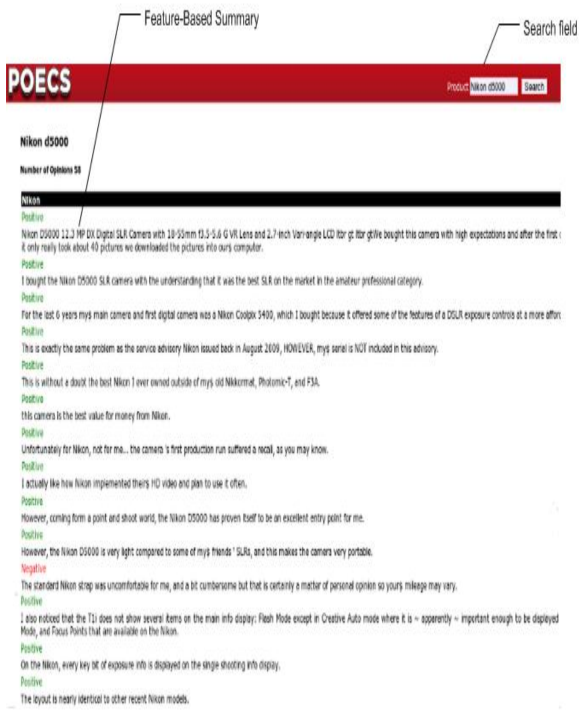
A. Technologies Overview

Different technologies were used in the development of POECS. The system must provide strong non-functional requirements guarantees (e.g. performance). The system needs guarantees that the non-functional requirements (e.g.performance) will be adhered to, so that the whole system can work properly. Without such guarantees the system may become infeasible. As an example, the SMM discussed on the last chapter, has to deal with performance and faultolerance requirements, and building them from scratch can take a considerable amount of time in developing the prototype. It is wise to consider technologies oriented to agile development, which provides as many as possible \ready-to-use"components. Thus, more time can be devoted to the development of functional requirements, delegating the responsibility of building the whole infrastructure to COTS (Components o_-the-shelf).

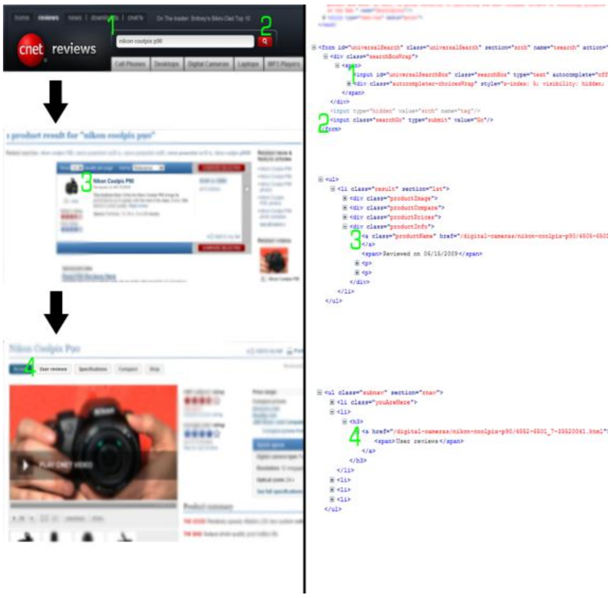
B. Web-based User Interface

The Web-based user interface provides a very easy and straight-forward way to interact with POECS. The user requests the service by providing a product name as illustrated on the upper right corner of figure.

Web-based user interface - A user requests the service by entering a product name on the search field and submitting it.



C. Opinion of the particular product



Web-based user interface - A user requests the service by entering a product name on the search field and submitting it.

X. FEATURE BASED SUMMARY GENERATION

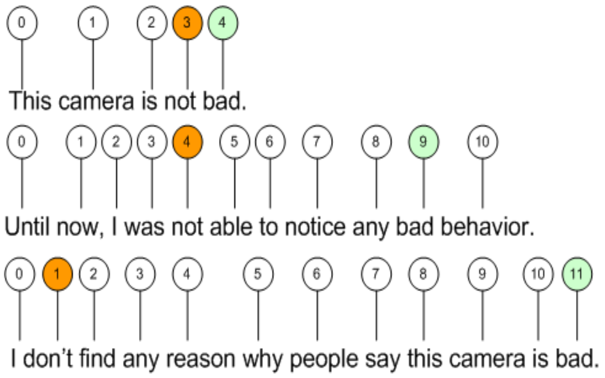
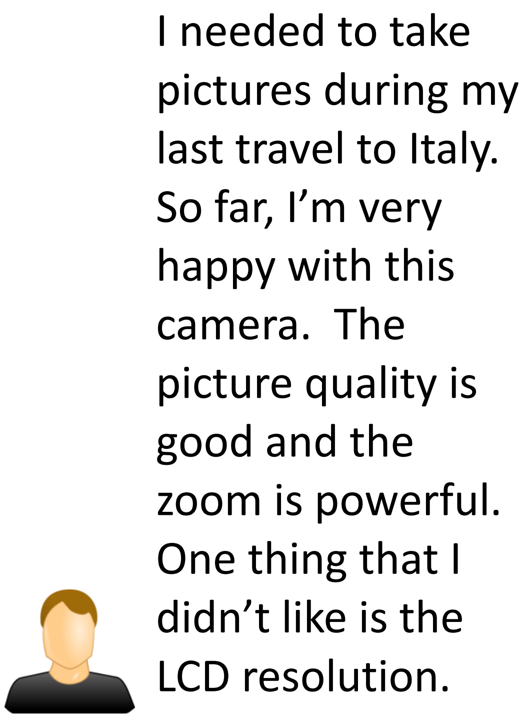


Figure 4: Sentences with negation words - This examples show the difficulty to define boundaries for word distances

A. Opinion Sentence



B. Test Environment

Effectiveness of Automatic Feature Identification, The automatic feature identi_cation of POECS, which uses the frequency of words to determine the likelihood of a word to be a real feature, had its effectiveness evaluated as shown in figure

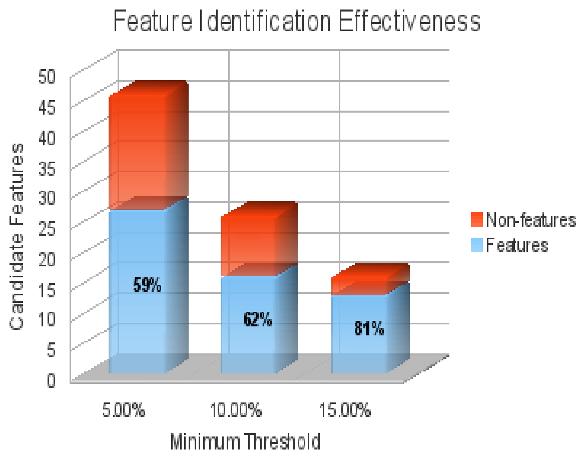


Figure 5: Effectiveness of the automatic feature identification algorithm

CONCLUSION

Opinions are a unique type of information which are different from facts. The methods for content classification based on ranking (like those used by search engines) are not effective or simply do not accurately depict reality, as one opinion is different from multiple opinions.

During the evaluation of POECS it was possible to see that it is feasible and re- liable to build system capable of classifying and organizing opinions through the so called feature-based summary, which resumes the most relevant information for users. However, it is undeniable that a great number of opinions are difficult to classify due to the complexity of the human language

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