Chapter 72
Ontology-Based Opinion Mining for Online Product Reviews

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ABSTRACT

In this chapter, the authors work at the feature level opinion mining and make a user-centric selection of each feature. Then they preprocess the data using techniques like sentence splitting, stemming, and many more. Ontology plays an important role in annotating documents with metadata, improving the performance of information extraction and reasoning, and making data interoperable between different applications. In order to build ontology in the method, the authors use (product) domain ontology, ConceptNet, and word net databases. They discuss the current approaches being used for the same by an extensive literature survey. In addition, an approach used for ontology-based mining is proposed and exploited using a product as a case study. This is supported by implementation. The chapter concludes with results and discussion.

INTRODUCTION

Opinion mining is also referred as Sentiment Analysis, is a study that comprises of people's emotions, sentiments, behavioral patterns, opinions towards objects like situations, events, products, persons, organizations and similar objects in nature around us. Closely related terms with opinion mining or sentiment analysis but meant for different tasks and purpose are sentiment mining, affect analysis, review mining, opinion extraction, etc. Since, the growth of e-commerce sentiment analysis has become a strong area of research so in this chapter we shall define and discuss the problems associated, along with their solutions by describing the techniques for solving them. Sentiment analysis and opinion mining mainly focuses on opinions which express or imply positive or negative sentiments. The research gained its demand and has become an area of research for the fact that e-commerce gained its popularity. It has kind of binded

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and shrunk the world. All of us have drifted from the conventional means of buying and shifted to usage of e-commerce. This resulted in proliferation of commercial applications. Secondly, this factor led to a series of challenging research problems one of them being opinion mining. These have led to enormous opinionate data being generated in the Web, more so because of social media influence.

Opinions, which are important influencers of our behaviors, form a focus in all human activities that we perform. Any decision making that we do, we seek the opinions of others. Though, the process of collecting opinions has changed with time. In the past, opinions were collected from friends, family members, surveys, polls and questionnaires. These were useful for businesses like marketing, public relations and even for political campaigns. But today, in e-commerce context and due to the explosive advent of social media, whenever a buying decision has to be made for a product, we are not limited to consulting the above means for opinions; rather the user reviews and discussions on the public forums available on the Web are useful. People make their buying decisions on reviews. The reason is quite obvious, consumer products and services that include movies, clothing, electronic items and hotels are frequently being discussed by the websites in the form of shared opinions (Deshpande & Sarkar, 2010). Famous examples of websites having reviews include www.amazon.com, www.flipkart.com, www.ebay.com and many others. These websites allow the users to express their opinions about the product bought. Thus, when a buying decision has to be made by a new user, he/she reads the reviews and benefits from these reviews. Customer's comment usually covers various issues that are related to different types of products. Some comments are termed as general comments but some focus on certain types of specific technical issues related to any particular product.

Ontology, generally refers to the domain being studied (Gruber, 1993).Its main aim is to provide an insight into the concepts and knowledge which both the developers and the computers can understand. Thus it enumerates the concepts related to domain and explains the relationships that exist between the concepts (Guarino, 1995). Ontology can lead to remarkable improvement in information or feature extraction and reasoning (Pang & Lee, 2008) and also make data interoperable in several applications (Baziz, Boughanem, Aussenac-Gilles, & Chrisment, 2005; Duo, Juan-Zi, & Bin, 2005; Fensel, 2002; Zhou&Chaovalit, 2007). Meersman (2005) suggested that ontologies in context of information also known as data models can be helpful in the construction of a narrow application domain. This paper also highlights that ontologies which include lexicons and thesauri is a useful step for formalization of semantics of information representation. If Lexicon on one hand is language specific ontology, then thesaurus on the other hand is either domain specific or application specific ontology. Ontology theory, manufacturing are domain specific and airlines reservations, Inventory control are a few examples of application specific Ontology.

This chapter shall perform ontology based opining mining for online product reviews. First and foremost, we shall perform preprocessing, which is necessary as presence of irrelevant and incorrect data cannot be ruled out. Several methods like stemming, sentence splitting, and tokenization shall be explored. The next step would be to construct ontology to extract product features in the reviews and thus generate a feature based summary. In order to construct this, we may use ConceptNet (Speer, 2016).

BACKGROUND

The term sentiment analysis was suggested in Nasukawa and Yi, (2003), and opinion mining in Kushal, Lawrence and Pennock, (2003). But related research or concept can be found in Das and Chen (2001);