Chapter 13
Applications of Ontology-Based Opinion Mining

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ABSTRACT

Ontology provides a technique to formulate and present queries to databases either stand-alone or web-based. Ontology has been conceived to produce reusable queries to extract rules matching them, and hence, it saves time and effort in creating new ontology-based queries. Ontology can be incorporated in the machine learning process, which hierarchically defines the relationship between concepts, axioms, and terms in the domain. Ontology rule mining has been found to be efficient as compared to other well-known rule mining methods like taxonomy and decision trees. In this chapter, the authors carry out a detailed survey about ontology-related information comprising classification, creation, learning, reuse, and application. The authors also discuss the reusability and the tools used for reusing ontology. Ontology has a life cycle of its own similar to the software development life cycle. The classification-supervised machine learning technique and clustering and the unsupervised machine learning are supported by the ontology. The authors also discuss some of the open issues in creation and application of ontology.

8.0 INTRODUCTION

Ontology is widely used in machine learning. It is used for instance, in the following applications:

- Classification of customers' reviews of items such as books, movies or any product or service.
- Sentiment analysis using text retrieved from social media.
- Rule mining in semantic web.

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With the advent of Web 2.0, the number of Internet users is growing and thereby contribute data to the common pool of global resources. Social networks are important sources of data which can be gainfully used with the help of machine learning techniques for sentiment analysis, product market analysis, changing opinion of the consumers for products etc. The increasing velocity, variety and volume of the data which is popularly known as big data (Xia, Wang, Berkele & Liu, 2017; Padhy, Mishra & Panigrahi, 2012) has resulted in advanced research in machine learning techniques. Usage of Ontology with big data provides significant savings in efforts, cost and efficiency.

8.1 ONTOLOGY

Ontology is a hierarchical representation system. Ontology finds wide use in genetic algorithms, medical databases and machine learning. Since the early 2000s, ontology is applied in semantic web. In the early 1990s ontology was defined by Gruber as "a formal, explicit specification of a shared conceptualization" (Gruber, 1993). It provides a formal and shared conceptualization of a domain that helps in ensuring communication amongst people and supports interactions among application systems.

Creating ontology for an application enables the following:

- A formal documented vocabulary.
- A formal representation understandable by machine.
- Understanding concepts of application domain such as supermarket application.
- Reusing of concepts.
- Sharing of concepts.

8.1.1 Ontology Classification

Ontology can be classified based on the following:

- Creation methodology adopted
- Application

8.1.1.1 Ontology Classification Based on Creation Methodology

The ontologies can be classified into the following based on the methodology adopted for their creation.

- Supervised
- Unsupervised
- Upper / top ontology
- Domain ontology
- Metadata ontology
- User-defined ontology

The creation of ontology can be manual, semi-automatic or automatic. The reference to the research articles discussing the three types are given in Table 1.