

ONTOLOGY-BASED REAL-TIME SENTIMENT ANALYSIS FOR PRODUCT REPUTATION

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Abstract

Social media platforms have become influential channels for user interaction, enabling the creation and exchange of content within virtual communities. E-commerce sites like Amazon, eBay, and CNET leverage user-generated reviews and ratings to influence purchasing decisions. However, current review systems are often centralized, static, and vulnerable to false evaluations, lacking the adaptability to reflect real-time consumer sentiment. This research proposes a dynamic, ontology-driven reputation system that continuously evolves to provide accurate and timely product ratings. The system collects online reviews, performs sentiment analysis to extract opinions, and uses a semantic layer to build contextual profiles for decision-making. An adaptive ontology integrates with a database to map relevant structures and generate semantic queries, delivering actionable insights. By enabling real-time adaptation and greater transparency, this approach empowers consumers and manufacturers to make informed decisions based on up-to-date reputational data.

INTRODUCTION

Reputation and influence in the digital age must be earned through genuine engagement and value. Social media serves as one of the fastest and most effective means for individuals and organizations to showcase their credibility and connect with audiences. It enables users to create, share, and exchange information, ideas, and content within virtual communities and networks. A significant application of social media today lies in the realm of e-commerce. Platforms such as Amazon, eBay, and CNET offer users the ability to review and rate products based on their personal experiences. These online rating systems have become essential tools for guiding purchasing decisions and building trust among consumers. Any product made available on such platforms can be reviewed and evaluated, contributing to its overall acceptance and reputation in the

marketplace. Clients buy various items from these sites. The clients who bought the items share their experience concerning that item online as survey [1]. This review is vital for client and producer. At whatever point a client needs to take the choice for buying of any item it is assumed a significant part [2]. Prior to buying any new item, the new buyer needs to use the survey of post buyer who are now utilizing that item. Reviews are frequently valuable for the purchasers before buying items. The reviews of the items given by the clients are especially useful for the organizations to know the positive and negative places of their items to work on the nature of the items [3]. Clients can give their customized experiences as text or as appraisals. There are two kinds of client reviews, for example, client rating (numeric rating) and client assessment (text based depiction) [4]. Client rating is

a numeric rating that allows individuals to rate an item or administration with various stars. The quantity of stars can differ from 1 to 5 stars. Assessment is an assertion of counsel by a specialist on an expert matter.

A client assessment can be positive, negative, unbiased feeling or mentality about the item. The feelings present in the feedback in regards to the item includes give exhaustively in understanding the surveys and furthermore help in the investigation of the element opinions of the item. It is hard for the clients to extricate the significant data from the audits. Opinion investigation is the method involved with recognizing positive or negative feeling in verbal form. It is utilized to remove the significant data from the survey [5]. Ache and Lee indicated terms identified with the feeling examination [6]. The space of opinion examination is driven by regular language handling, man-made consciousness and data recovery framework. Feeling investigation is known as assessment mining. The assessment mining is to distinguish the gathering of individuals' viewpoint in regards to one issue or item. The point of opinion examination is to distinguish the direction of the feeling communicated in written form. This space of examination named as Subjectivity Investigation concentrates on the feelings, opinion, assessment, way and assessment [7]. The sentence which offers some viewpoint is called abstract, while the sentence which doesn't contain any assessment is called evenhanded or verifiable [8]. Both, the report level and the sentence level examinations didn't find the exact preference of the customers and what they disliked. Perspective level executed a better analysis. Previously, Perspective level used to be called the highlight level (as it included base assessment along with the rundown) [9]. Instead of taking the language develops into consideration like (reports, passages, sentences, provisos or expressions), angle level simply take into consideration only the actual assessment. It revolves around the probability that the evaluation consists of a feeling (i.e. good or bad) and an objective (of assessment) [10]. Sentiment analysis detects the opinion of people about product either it is good or bad. But on the other hand, product reputation method is used to aggregate both types of rating. In e-commerce sites, product reputation is also very

important. In such websites, user can send the ratings and reviews of various products. These ratings are used to calculate the reputation. Reputation of the product is the measurement of its quality [9] and customer satisfaction [10]. Different reputation measures such as aggregated star value (also called five star or simply star value), feature reputation and product reputation are used to calculate the reputation of a product. People or companies can post fake ratings for various reasons like promoting their product or maybe discrediting the alternative products of competitor [12].

The Decay Principle was employed to check the latest ratings and compare them with previous ratings to establish latest viewer thinking. The reputation Model may be used to employ any of the methods in the user interface to compute the data. Similarly, the window selected in hybrid decay is based on parameters, which are also taken from users (who want to compute reputation value of a product) through a user interface. But, sometimes it can be difficult for ordinary users to decide the appropriate decay principle for a product. In addition, if they select hybrid decay, then sometimes they are not able to enter optimal values for the parameters [13]. But linear decay is centralized and whole process is static. Rating is changing with respect of time. Linear decay is not suitable for this type of rating. There is need of dynamic system [14]. This paved the way for constructing new ontology. Anew ontology is to be constructed to enable the continuous detection and taking into account latest reviews also [15]. Ontology structuring gives us real-time changes in different services which are already being stored in it.

Reasoner part uses semantic rules for the assessment of efficiency of ontologies. Ontologies record present or old intelligent techniques for decision making and their results, define the rules, and gives us a hierarchy system do decrease the time of searching. Ontologies present semantics and data together to help make easy information transfer. Ontology reasoning and modelling to help facilitate changing business needs within a time frame.

Many websites here, available in network for online business such as Amazon, EBay, Cnet. These type websites are providers of an excellent rating system of products that is used by consumers for the rating of

certain products according to their usage and experience. When, any new customer wishes to buy any product he goes through the reviews and ratings by the already existing customers and gets the idea of the efficiency of the product. The review of any product existing online or offline is also important to the developers and companies as they can analyze the strengths and weaknesses of their product and those of its competitors. This analysis result in research to enhance the product quality and features. There are two type of review such as numeric review (Star) and other one is textual review (opinion). The number of stars can vary from 1 to 5 stars. A customer's rating can be good, bad, neutral, open or anonymous about the given product. However, the opinion or thinking towards the product may vary as the time passes. This variation in thinking and rating may arise due to different factors like advancement in technology, changed market trend, different customer requirement and quality changes in the given product. The existing product review systems are centralized and the whole process is static and product ratings change rapidly. It is easy to avoid false evaluation, handle new changes and reduce the time to obtain customer review from the perspective of customer and manufactures. Purpose of this research was to create a comprehensive and definite ontology which can evolve with the passage of time. Creation of an ontology that can evolve with time We propose a system those compute dynamic rating. The process was simplified into three layers in order to achieve the desired reputation model. First layer is data collection. We took a dataset which contain reviews of product from internet. Second layer is sentiment layer in which features are extracted from reviews of product. Sentimental analysis is applied in the base of these features. Third layer is semantic layer in which we create semantic profile. Semantic profile can provide central idea of the decision support concepts. Firstly, we make an ontology. In the second step, we build a database connection. The next step is to create mapping. Last step to generate query.

1. LITERATURE REVIEW

It's the age of technology, people are putting their ideas on social media whenever they want to do. Social media a platform for networking, association,

social interaction, online evaluation and a great source of online chastity and trustworthiness indicators data. In online business, a product can be defined as a system or thing designed for the use of buyers. Anything which is available on an online store to fulfill the needs and requirements of the customer. The difference in the services delivered public and level of fulfillment of their requirements, effect of the services plan public opinion either positive or negative.

2.1 Sentiment analysis

Text mining is further divided into different categories, one of which is Sentiment analysis, in which IT is used for estimating & elaborating feelings expressed in written form on media. Natural text processing are employed for this cause [16]. Sentiment analysis, also called opinion tracking, works on public's opinions, ideas, analysis, appreciations, behaviors, and mental approach about goods, services, institutions, persons, occurrences, public affairs, ideas and their elaboration [17]. The sentiment may be good, bad or neutral appreciation, feeling or behavior towards a specific context of the product from a person. Opinion dimensions are good, bad, and neutral. The review is categorized as good or bad by the opinion categorizer [18]. The sentence which expresses some opinion is called subjective, whereas the sentence which does not contain any opinion is called objective or factual [22-25].

2.2 Product Reputation Model

Olaleye et al explained in their article that sentiment analysis is a prerequisite for management of the services and product reputation online (an extension of public relations). Online reputation management is a long-running way of maintaining the image of an organization by online and printed media [27]. Reputation of the product is a perception of the future behaviors and quality of the product. Numerous reputation techniques including aggregated star system (ranging from one to five stars) [28], reputation of features [29] and product reputation on the basis of features [30] are used in the literature to evaluate a product's reputation. These values of reputation are useful in making decisions for both customers and organizations [31, 32, 33]. The

decay principle is applied for supporting the new ratings in place of the previous ones to show the latest and new opinions. In peer to peer (P2P) and e-commerce environment this principle is applied in three methods or aspects: use of recursive algorithm, exponential decay and window-based system. The easiest method to apply the decay principle is selecting a specific period of time and use the ratings uploaded in that period of time to calculate reputation [35, 36, 40].

2.3 Ontology in sentiment analysis

Ontology is a collection of features and concepts in a subject or domain area that shows relationship between concepts. Mining of opinion or Sentiment analysis is used for analyzing feedback, reviews and opinions given by customers about any services, the movies, and the products. When the buyers think about buying anything online, they have to see the online review of that product before buying that thing. Buyers around the globe using that specific product post their comments on the marketing websites from where the buyers can buy that specific product. Evaluation of all reviews is done on these websites and they are rated from zero to five. Pattern of reviews is the basis of this rating. Exact results are not awarded in this kind of ratings. Bandari et al [14] made a list of all the issues which different languages face using ontology while investigating the feelings and emotions of reviews of the buyers and tried to solve these issues. Kontopoulos et al [40] explains in their paper that advent of Web 2.0 has significantly changed the perception of net users through making a drastic improvement in sharing of information, interoperability, and collaboration. The author suggests the deployment of techniques based on actual ontology for more effective sentiment analysis regarding posts on Twitter. It increases efficiency. Bandari Et al [41] said there are many e-commerce websites available where products are bought and users give their reviews on the products given or the services provided. The purpose of this study is to use ontology to have a survey and analysis of product reviews by customers having different languages. Our purpose is also to highlight the issues present in analyzing products reviews of different languages. So, we performed an experiment by using ontology to

sentiment analysis of product reviews on a Hindi mobile phone online platform and tried to decrease the issues in such previous systems. Ali et al[42] said in their study that traffic density is being increased in urban areas at a much faster pace, especially in big cities. This system gets all the transportation and city related tweets and reviews and from this taken data we extract the opinions and use fuzzy ontology to get different transportation and city features. They used OWL and java to devise an intelligent prototype and fuzzy ontology. The results obtained from the experiments show that the experiment was very much satisfactory. Nithish et al [43] said A lot of important information cannot be distinguished from documents because much data is present on the internet. People associated marketing and sales use online forms to conduct surveys and queries to analyze their products distribution. We use OWL format and store the product description and reviews together in domain ontology. After embedding the opinions in the ontology, this method can be used to do reasoning and solving intelligent questions. Sam et al [44] proposed a design which could be a generalized model. This model analyzed unstructured reviews of the users from social media posts related to electronic products. Positive and negative factors were added to increase precision of the model. Kumar [45] explained that WWW is a universal information platform which was at beginning read only but it innovated very fast and changed from 'read only' to 'read and write' and then it evolved into intelligent 'read write and execute' also known as semantic web. The initial experiment results show that the model was successful with 77% accuracy and we should focus on more sentiment analysis-based models. Zehra [46] suggested a system which would recommend schools having sentiment analysis on the basis of ontology. For this study, we used a private group on Facebook which reviews different schools and posts them. We designed a school ontology on the basis of taken reviews/posts manually. This increased reasoning. Ali et al [47] expressed in his paper, most products or services get more potential users due to user reviews present online. The key achievement of the suggested model is integration of Natural Language Processing model and ontology for recording reviews information by customers. The suggested model was experimentally

expressed on the data from customers reviews of a digital camera by Amazon. Yergesh et al [48] states that sentiment analysis is vital and intriguing to use in natural languages. In this paper, we designed sentiment words Kazakh Dictionary. In this study, they did sentiment analysis of Kazakh language works using the dictionary based on ontology and phonological rules. A model was created which determined sentiment on basis of ontology and rule extraction. This method if used on common sentences gained 83% precision. Marstawi et al [49], argued that the existing firmware in sentiment analysis mainly sideline or remove the complex issues arising from the Lexicon based scores (SentiWordNet), while Lexicon analyses classifying the data on basis or word existence and number of words are very less. So, there is automatically very low rate of detection. The result was an OBPS system that performed better than already existing models in mining and sentiment rating. OBPS gives linguistic rules working at level of sentences increases the overall efficiency and provides a precise sentiment analysis. Nagano et al [50] proposed designing of a model for analyzing opinions for market research named as WOM Scouter. Other function is the comparison of two products and their features by their link traffic and recurrence in the text. Assessment through experiment expresses blog viewers liked this presented algorithm more than TF-IDF. Abdel-Hafez et al [51] explained that much of the present reputed models use the customers ratings but mostly ignore customer's review texts. Therefore, they said that customer ratings of a product not actually express the original reputation of the product features. So, customer's review mandatory. They also provided experimental results and complete case study for comparison with other such models. Abaalkhail et al [52] explained that ontology can comprehend the relationships between concepts and the association within contents. Their experimental results show that that this ontology is as much efficient as machine learning techniques. Their presented model DFSMD has been accessible to everyone or anyone can use it to analyze different sentiment issues. Rekha [53] said about the semantic analysis that it is a technique which is devised to obtain customer opinions and reviews regarding to a

certain product. These days, reviews of most of the products can be mined from web due to evolution of technology. The experimental results of presented algorithm were very satisfactory and presented features of cellphone. Polsawat [54] explained that much of the data in Social Media is being used to aid the users in selecting and buying products. The experimental results show almost 94% efficiency in sentiment analysis. Channa et al [55] explained that OWL-S and RDF-S were designed from Analytical Philosophy and their ideas about ontology and General semantics and techniques of product knowledge were assessed. Semantic languages have been famous and due to their flexibility techniques based on ontology and Semantics were suggested to design product knowledge. Ali et al [56] explained that social media have a vital role in collecting information about transportation and travel services. Systems for management and control of traffic make use of sentiment analysis which with its reasoning helps ITSs (intelligent transportation systems). The presented ontology was designed using OWL and the smart model was created with the help of Java. For the assessment of this model we used classifiers based on Machine learning. The experimental results show that model was effective and gained 93% accuracy.

2.4 Comparative Analysis

The comparison chart below is designed to check various factors such as Static, Dynamic, Efficient, Accuracy, Reasoning, Polarity, Reliability, Precision and recall. Static means not moving or changing. Dynamic Means continuous changing and developing. Efficiency is the ability to produce something with a minimum amount of effort. Accurate is exact and true. Accuracy is the degree of closeness to true value. Reasoning is a way of thinking about anything in a rational approach for forming an assumption or a conclusion. A performance is a way of presenting a show, or any other kind of theater. Polarity is commonly used to describe if an electrically charged stream is negative or positive, the direction of a battery, the polarity of a magnet, etc. Precision is the degree to which an instrument or process will repeat the same value.

Table 1. Comparative analysis of literature review

Study	Static	Dynamic	Reliability	Precision	Recall	Accuracy	Polarity
Twitter Reviews [41]	√					√	
Languages [42]	√			√		√	
Transportation [43]	√		√			√	
Mobile [44]	√		√	√	√		√
Electronic products [45]	√		√	√			√
social web [46]	√		√		√		√
Recommendation Systems [47]	√		√		√		
Online customers' review [48]	√			√		√	
kazakh sentences [49]	√			√		√	
Product reviews [50]	√		√		√		√
Ontology-based topic extraction [51]	√			√		√	√
Ontology product's reputation model [52]	√			√			√
Multimedia [53]			√			√	
Online mobile reviews [54]	√		√	√	√	√	
Customer Reviews [55]	√		√	√		√	√
constructing product knowledge [56]	√		√	√	√	√	

2.5 Analysis

From the analysis of the papers mentioned in table 1, we observe that sentiment analysis or opinion mining is used to analyze the opinions, reviews, and feedback given by the customer about product. Different author uses different techniques to improve Accuracy, Efficiency, Reasoning, Performance, Reliability, Precision and Recall. Current product reputation is used to make an ontology to compute twitter post, languages, review on mobile phones, review on electronic devices and different products. Current product reputation system is centralized and the whole process is static. However, Product Ratings are change rapidly. Therefore, there is a need of dynamic system. Ontology construction is the work of this experiment. By constructing the ontology, automatic identification and extraction of the user opinions from the reviews are possible.

3. PROPOSED METHODOLOGY

3.1 Proposed approach

In the previous section, we have discussed the product reputation system. Based on the need for a dynamic product reputation approach, we propose a semantic product reputation system answering the research issues highlighted in the state of the art. Figure 1 shows the whole process of the semantic product reputation model which is divided into three phases. First phase is data acquisition in which review is collected from internet. Second phase is sentiment layer in which features are extracted from reviews. Sentimental analysis is applied in the base of these features. In third phase, we use semantic knowledge for purpose of making an automatic system. we develop inference based semantic rules for Dynamic product reputation while query generation has been done.

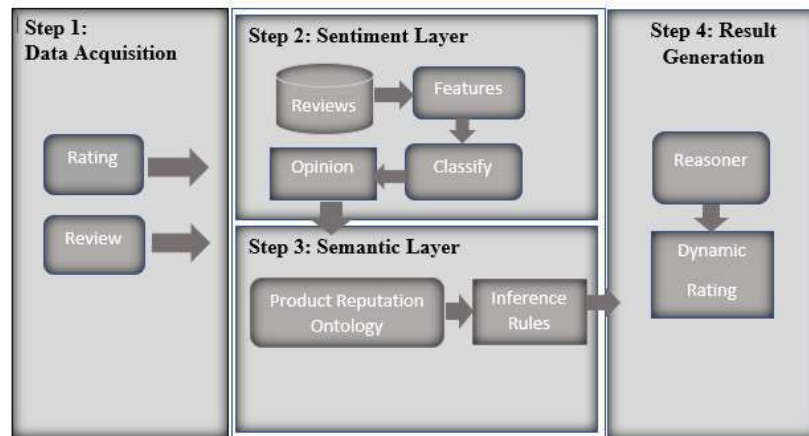


Figure1. Semantic Product Reputation System

3.2 Data Acquisition

First of all, we took a dataset of product reviews of Amazon from kaggle.com [57]. The dataset was designed specially to show user reviews and opinion, how it is viewed in various countries and its promotional potential. We used musical instruments as our product.

The dataset consists of:

- **ID:** Review ID
- **Manufacturer:** Amazon
- **Types:** Product Type
- **Asin:** Product Asin
- **Reviewer:** Reviewer name
- **Helpful:** Helpful for customer
- **Review Text:** Review in Text
- **Rating:** Rating of product (1-5)
- **Review Date:** Review time
- **Opinion:** Customer opinion

The extracted reviews contain opinion about customer service, review about the product, comparison with other products and suggestions to improve features of the product. There are two type of customer review such as customer rating and customer opinion. Customer rating is a numeric rating such as star rating 0-5. A customer opinion can be positive, negative or neutral appraisal, emotion or attitude about an aspect of the entity from an opinion holder. Opinion orientations are positive, negative, and neutral.

3.3 Sentiment Layer

The customer opinion from this dataset consists of sentences that are provided by the customer. Different online tools are available in internet for sentiment analysis. We use MonkeyLearn [56] for classifying positive, neutral and negative reviews. We create a new model. There are two types of models available. First one is classifier in which we define some tags (features) in review sentences. The other one is extractor which extract specific pieces of data from review sentence. We will create a classifier. Then, there are three kind of classifications such as topic classification, sentiment analysis and intent classification. Topic classification classifies texts based on topic and aspects. Sentiment analysis detects sentiment in text such as positive, negative or neutral. Intent classification classifies text based on intent such as complaint or feedback. We will choose sentiment analysis. Then we import our dataset here in CSV column. Our complete dataset was uploaded to the classifier. Then, we extract the features in the review. There are several features of product such as project display, product size, product function, product price and product type. This tool distinguishes positive, negative or neutral reviews based on their features of product.

3.4 Semantic Layer

A semantic profile can capture and represent the core concepts of a decision support system. The process begins with the development of an ontology to define the domain knowledge. Next, a connection to the relevant database is established. In the following step,

semantic mappings are created to link ontology concepts with database elements. Finally, using OWL and SPARQL, we perform queries to extract meaningful insights from the data. As time passes, product reviews given by different people change. These variations might be due to different reasons like change in user requirements, improvement in product quality, market trend and evolution of technology. Mobile phone reviews might not remain same now compared to a few days back due to reason that new phones with better specifications and sophisticated hardware might be available in market. Due to this problem, we make an ontology to automatically compute dynamic reviews. If the new product is introduced with high camera and high video speed, then people will definitely change their review. This changing review is computed by our semantic product reputation system.

3.5 Product reputation Ontology

In this section, we present the ontology developed using Protégé to model and highlight dynamic product reputation. The ontology captures the core concepts related to products and their associated reputations. A product is defined as a tangible good or item available on various e-commerce platforms. For illustration, we focus on Amazon, a widely used online marketplace where users can post reviews and ratings for purchased products. These user-generated reviews significantly contribute to the perceived reputation of products. Ontology, in this context, refers to a structured representation of knowledge that defines concepts and the relationships between them. Our product reputation ontology is designed to formalize these relationships and is depicted in Figure 3. The ontology incorporates multiple classes to represent different concepts within the domain.

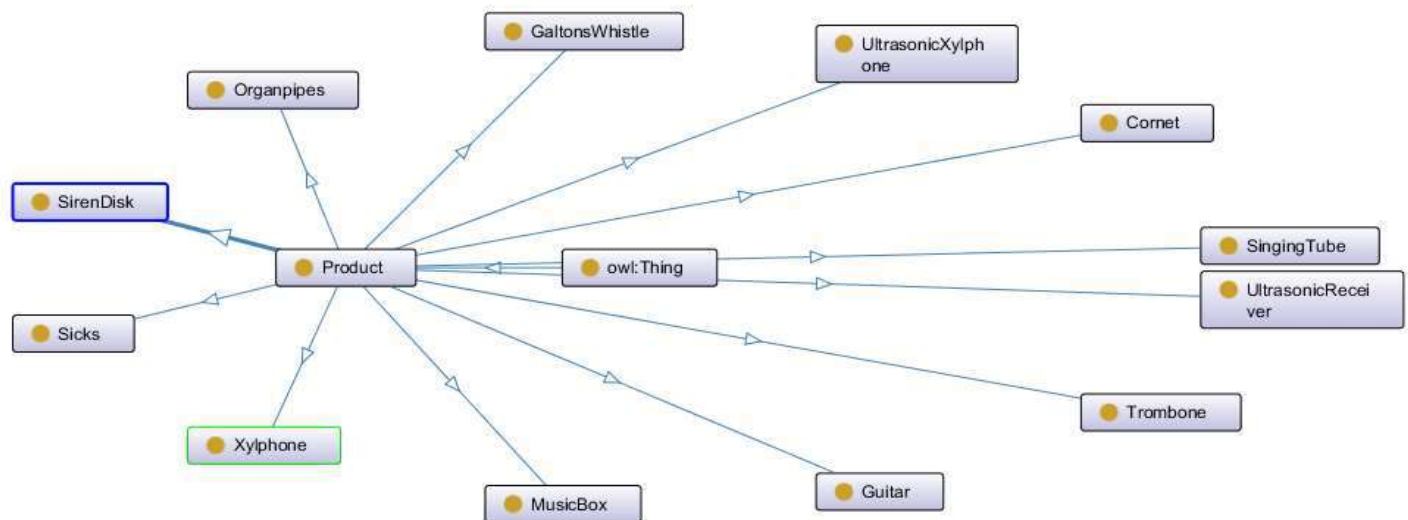


Figure 3. Product Reputation Ontology

3.6 Product Reputation Classes

In an ontology, classes are organized hierarchically into two types: superclasses and subclasses. The 'Product' class serves as a superclass, encompassing various specific product types as its subclasses. These include Guitar, Cornet, Sticks, Singing Tube, Music Box, Trombone, Xylophone, UltrasonicXylophone, Galton's Whistle, Siren Disk, and Ultrasonic Receiver. Object properties are used for making relationship between two individuals. If we want

relationships between individual to individual, then we make object properties.

3.7 Product Reputation Data Property:

In Protégé, data property is used to describe relationship between individual to literal. Our data property is Id, Manufacturer, Opinion, Rating, Review date seen, Reviewer Name, Reviews Date, Review Text, Summary, Types and Unix Review Time as shown in figure 4.

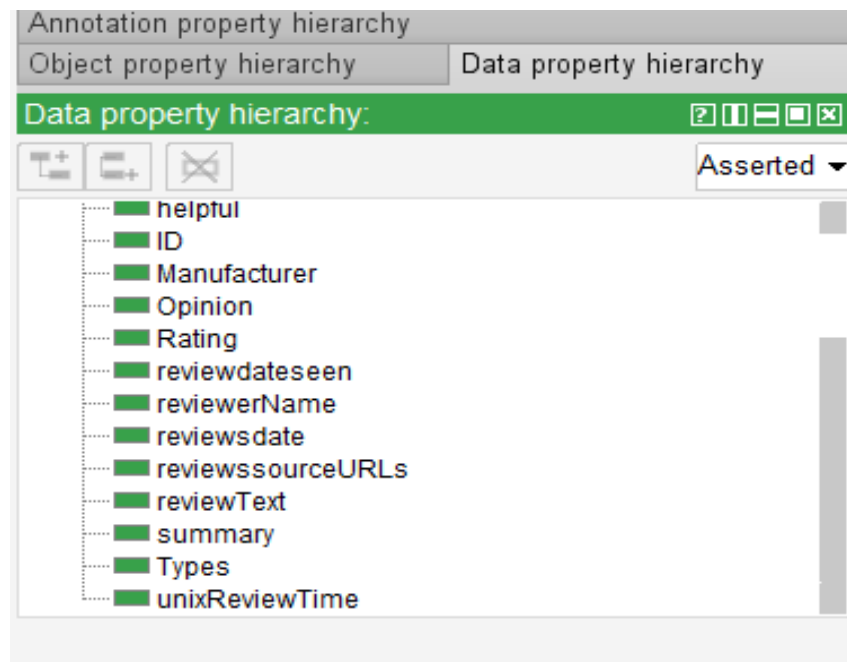


Figure 4. Product Reputation Ontology Data Property

3.8 Database Connectivity and Query

We uploaded the dataset in workbench, then attached the workbench to protégé. Here, we need jdbc driver, Database Username, Database Password and connection URL. Then click on Test Connection and our database connection is created. JDBC driver is used in protégé. JDBC stands Java Database Connectivity Framework. It is used to connect data sources. First download the jdbc driver. Open the protégé, go to files, click the preference and move to JDBC Driver and then add it.

In protégé, we move to ontop Mapping, three tabs are available here on the top including Datasource manager, Mapping manager and Mapping Assistant. Datasource is used to make database connection. Mapping manager is used to store mappings. Mapping assistant is used to make mapping. We select table form database.

4. RESULTS AND DISCUSSION

In this section, we present the semantic rule-based framework developed for modeling dynamic product reputation. The ontology was constructed using Protégé in the Ontology Web Language (OWL), enabling formal representation of domain knowledge. For experimentation and simulation, a structured dataset was utilized, and an intermediate software

component was developed to support OWL/XML parsing and integration for implementing the dynamic product reputation model, as illustrated in Figure 1. To facilitate semantic integration, ontology-to-dataset mappings were created for a variety of products including Guitar, Cornet, Galton's Whistle, Music Box, Organ Pipes, Sticks, Singing Tube, Siren Disk, Trombone, Ultrasonic Receiver, Ultrasonic Xylophone, and Xylophone. Inference-driven semantic rules were defined to capture the evolving nature of product reputation based on user-generated reviews and product attributes.

SPARQL queries were formulated to extract and validate semantic insights derived from the ontology. These queries were executed within the Protégé environment, and the Reasoner was configured and initiated via the Reasoner menu to ensure logical consistency and derive inferred knowledge. The use of semantic rules in conjunction with SPARQL enabled dynamic and explainable evaluation of product reputation across multiple product instances.

4.1 Guitar

After developing the ontology in Protégé, we established mappings and applied inference-based semantic rules to distinguish between positive and negative product reviews. The Reasoner was utilized

Mapping ID: MAPID:791cb3751ed146dc951fcd2649886e0

ID	Manufacturer	Type	asin	reviewerName	helpful	reviewText	Rating	summary	unixReview	reviewDate	reviewDateStr	reviewScore	Opinion	FIELD15	FIELD16	FIELD17
400	Amazon	Galton's Wh.	B0002CZV71	JosAmamya	[0, 0]	Man this is	5	just perfect	1340150400	2016-12-12	2017-07-03	http://review	Positive	null	null	null
401	Amazon	Galton's Wh.	B0002CZV71	SoundShower	[1, 2]	The Boss C	4	Boss C83	1332374400	2016-12-12	2017-07-03	http://review	Positive	null	null	null
402	Amazon	Galton's Wh.	B0002CZV71	StamJH1	[3, 5]	It really pain	4	Good, but	1346112000	2017-03-30	2017-07-03	http://review	Positive	null	null	null
403	Amazon	Galton's Wh.	B0002CZV71	William J. S.	[7, 8]	As a pro mus	5	Great Unit	1315795600	2017-03-28	2017-07-03	http://review	Positive	null	null	null
404	Amazon	Galton's Wh.	B0002CZV62	AF "Wings"	[0, 0]	Guitarists h	5	Does what!	1298592000	2017-03-28	2017-07-03	http://review	Positive	null	null	null
405	Amazon	Galton's Wh.	B0002CZV62	Chario	[0, 1]	Think of this	4	Sold pedal	1360540800	2017-03-28	2017-07-03	http://review	Positive	null	null	null
406	Amazon	Galton's Wh.	B0002CZV62	O. Blackburn	[2, 2]	I have had i	5	Delists so	1219448000	2017-03-27	2017-07-03	http://review	Positive	null	null	null
407	Amazon	Galton's Wh.	B0002CZV62	fendefele97	[1, 1]	This pedal i	5	Must have	1387092800	2017-03-27	2017-07-03	http://review	Positive	null	null	null
408	Amazon	Galton's Wh.	B0002CZV62	From Detroit	[2, 3]	This was th	5	Classic ped	1250737600	2017-03-27	2017-07-03	http://review	Positive	null	null	null
409	Amazon	Galton's Wh.	B0002CZV62	James Mou	[2, 30]	This is a ch	1	It delists	1256079400	2017-03-27	2017-07-03	http://review	Negative	null	null	null
410	Amazon	Galton's Wh.	B0002CZV62	Jared Band	[0, 0]	This is a di	4	The go to di	1313798400	2016-12-30	2017-07-03	http://review	Positive	null	null	null
411	Amazon	Galton's Wh.	B0002CZV62	Jerry	[1, 2]	I find that it	5	I like the so	1375920000	2017-01-07	2017-07-03	http://review	Positive	null	null	null
412	Amazon	Galton's Wh.	B0002CZV62	MetelFan	[0, 0]	This pedal	5	The classic	1332892800	2017-01-07	2017-07-03	http://review	Positive	null	null	null
413	Amazon	Galton's Wh.	B0002CZV62	Oto Carmat	[142, 153]	From Greg	2	Wish I knew	1309392000	2017-01-07	2017-07-03	http://review	Negative	null	null	null
414	Amazon	Galton's Wh.	B0002CZV62	Sam	[1, 4]	Here's the s	1	Beginners	1362048000	2017-01-07	2017-07-03	http://review	Negative	null	null	null
415	Amazon	Galton's Wh.	B0002CZV62	Shady Hing	[0, 0]	This is a litt	4	Nice pedal	1345161600	2017-01-07	2017-07-03	http://review	Positive	null	null	null
416	Amazon	Galton's Wh.	B0002CZV62	Shenels Ra	[0, 0]	This is the	5	Boss is the	1332115200	2017-01-07	2017-07-03	http://review	Positive	null	null	null
417	Amazon	Galton's Wh.	B0002CZV62	Slashaholic	[3, 4]	This pedal	3	The most b	1294444800	2017-01-07	2017-07-03	http://review	Neutral	null	null	null
418	Amazon	Galton's Wh.	B0002CZV62	Stevendeb	[0, 0]	I love these	5	Great pedal	1325402400	2017-01-07	2017-07-03	http://review	Positive	null	null	null
419	Amazon	Galton's Wh.	B0002CZV62	StomJH1	[0, 0]	There's so	4	Nostalgia	1343714400	2016-12-23	2017-07-03	http://review	Positive	null	null	null
420	Amazon	Galton's Wh.	B0002CZV62	StrDude	[2, 2]	It's a very	3	It's been at	1360777600	2016-12-23	2017-07-03	http://review	Neutral	null	null	null
421	Amazon	Galton's Wh.	B0002CZV62	StudioDude	[1, 2]	I know, I kn	5	Truly one of	1384795200	2016-12-23	2017-07-03	http://review	Positive	null	null	null
422	Amazon	Galton's Wh.	B0002CZV62	Victor	[0, 0]	This is an e	5	Great for	1252716800	2016-12-23	2017-07-03	http://review	Positive	null	null	null
423	Amazon	Galton's Wh.	B0002CZV62	Walter NYC	[0, 0]	First off a	5	Great 1st P	1324339200	2016-12-23	2017-07-03	http://review	Positive	null	null	null
424	Amazon	Galton's Wh.	B0002CZV62	Acrobase	[1, 2]	Good metal	4	Good metal	1305072000	2016-12-23	2017-07-03	http://review	Positive	null	null	null
425	Amazon	Galton's Wh.	B0002CZV62	Alexander V.	[0, 0]	I've had this	4	Still the best	1265846400	2016-12-23	2017-07-03	http://review	Positive	null	null	null
426	Amazon	Galton's Wh.	B0002CZV62	Asan	[4, 6]	To be honest	4	THE Metal	1314316800	2016-12-23	2017-07-03	http://review	Positive	null	null	null
427	Amazon	Galton's Wh.	B0002CZV62	From Detroit	[5, 5]	I have a list	5	Very useful	1270657600	2016-12-24	2017-07-03	http://review	Positive	null	null	null
428	Amazon	Galton's Wh.	B0002CZV62	Howett	[3, 4]	I bought th	5	Great far m	1192572800	2016-12-24	2017-07-03	http://review	Positive	null	null	null
429	Amazon	Galton's Wh.	B0002CZV62	JA	[0, 0]	It's a great p	5	Great	1299024000	2016-12-24	2017-07-03	http://review	Positive	null	null	null
430	Amazon	Galton's Wh.	B0002CZV62	Josh Lager	[0, 0]	BY FAR the	5	BEST PEDAL	1392573400	2016-12-23	2017-07-03	http://review	Positive	null	null	null
431	Amazon	Galton's Wh.	B0002CZV62	Mark3113	[3, 4]	Best of all	3	One of the b	1313034800	2016-12-23	2017-07-03	http://review	Positive	null	null	null

Test SQL Qu (100 rows)

Activate Windows Update Cancel

Reasoner active Show Inferences

Figure 7. Output of Galton's Whistle

4.4 Music Box

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The Output of Music Box is shown in figure 8.

Mapping ID: MAPID:791cb3751ed146dc951fcd2649886e0

ID	Manufacturer	Type	asin	reviewerName	helpful	reviewText	Rating	summary	unixReview	reviewDate	reviewDateStr	reviewScore	Opinion	FIELD15	FIELD16	FIELD17
1275	Amazon	Music Box	B0002E1G	EYE40ET	[0, 0]	This produc	5	I must have	1317888000	2017-01-02	2017-05-21	http://review	Positive	null	null	null
1276	Amazon	Music Box	B0002E1G	Frank archid	[0, 0]	No meanin	5	Nice	1383224000	2017-01-02	2017-05-21	http://review	Positive	null	null	null
1277	Amazon	Music Box	B0002E1G	Fred Smith	[0, 0]	This wider	5	Great produ	1388748800	2017-01-02	2017-05-21	http://review	Positive	null	null	null
1278	Amazon	Music Box	B0002E1G	Gregory Ma	[0, 0]	I have had a	5	so useful	1389139200	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1279	Amazon	Music Box	B0002E1G	Griffith	[0, 0]	This guitar	5	A Gem	1377960800	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1280	Amazon	Music Box	B0002E1G	G. Thomas	[2, 4]	Not much	2	Ok, but	1212527600	2017-01-01	2017-05-21	http://review	Negative	null	null	null
1281	Amazon	Music Box	B0002E1G	Guitar Oper	[0, 0]	Terrific Ath	5	Terrific Ath	1389916800	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1282	Amazon	Music Box	B0002E1G	Gustavo Pa	[0, 0]	After years	5	A must hav	1388016000	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1283	Amazon	Music Box	B0002E1G	Hagen Lebl	[0, 0]	I've been pl	5	The Handle	1346419000	2017-01-03	2017-05-21	http://review	Positive	null	null	null
1284	Amazon	Music Box	B0002E1G	Handsome	[0, 0]	Not as star	4	Not as star	1297500800	2017-01-03	2017-05-21	http://review	Positive	null	null	null
1285	Amazon	Music Box	B0002E1G	Harrie in Huz	[0, 0]	It is a ston	5	Works fine	1318608800	2017-01-03	2017-05-21	http://review	Positive	null	null	null
1286	Amazon	Music Box	B0002E1G	Howard J.	[0, 0]	I have one o	5	Put one in y	1384064000	2017-01-03	2017-05-21	http://review	Positive	null	null	null
1287	Amazon	Music Box	B0002E1G	Huetoos Ra	[0, 0]	This bad bo	5	Strange Co	1386489600	2017-01-03	2017-05-21	http://review	Positive	null	null	null
1288	Amazon	Music Box	B0002E1G	jaxon	[0, 0]	everything y	5	excellent	1380576000	2017-01-02	2017-05-21	http://review	Positive	null	null	null
1289	Amazon	Music Box	B0002E1G	J. Barera	[0, 0]	nothing fan	5	It works	1386159600	2017-01-02	2017-05-21	http://review	Positive	null	null	null
1290	Amazon	Music Box	B0002E1G	J. Edgar Ma	[0, 0]	Im not sure	4	Capable cat	1373034800	2017-01-02	2017-05-21	http://review	Positive	null	null	null
1291	Amazon	Music Box	B0002E1G	Jeff H	[0, 0]	What a grea	5	fantastic too	1389768400	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1292	Amazon	Music Box	B0002E1G	Jeremy D.	[0, 2]	Shipped dis	4	Well made	1400198400	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1293	Amazon	Music Box	B0002E1G	Jerry Connel	[0, 0]	This is a pr	4	cool	1360192000	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1294	Amazon	Music Box	B0002E1G	Jerry Robe	[0, 0]	Does what i	5	Wants	1402017600	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1295	Amazon	Music Box	B0002E1G	jimmpanther	[0, 0]	Works great	5	Effective str	1326844800	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1296	Amazon	Music Box	B0002E1G	J. Kim	[1, 1]	I bought th	5	Excellent str	1283712000	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1297	Amazon	Music Box	B0002E1G	Josh Lager	[0, 0]	This tool du	5	works wond	1339504000	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1298	Amazon	Music Box	B0002E1G	Joshua Sri	[0, 0]	A must hav	5	Nice	1366848000	2017-01-01	2017-05-21	http://review	Positive	null	null	null
1299	Amazon	Music Box	B0002E1G	J. Parlo Ha	[0, 0]	Great tool	5	Nice tool	1404854000	2016-12-31	2017-05-21	http://review	Positive	null	null	null
1300	Amazon	Music Box	B0002E1G	J. Penn "Zak"	[0, 0]	It cuts the st	5	A Handy Ga	1361318400	2016-12-31	2017-05-21	http://review	Positive	null	null	null
1301	Amazon	Music Box	B0002E1G	Julian	[0, 0]	Really help	5	Practical	1389952000	2016-12-31	2017-05-21	http://review	Positive	null	null	null
1302	Amazon	Music Box	B0002E1G	Kacmil	[0, 0]	its great for	3	enrich	1403300800	2016-12-31	2017-05-21	http://review	Neutral	null	null	null
1303	Amazon	Music Box	B0002E1G	Kodack	[0, 0]	The wonder	4	does the jo	1388880000	2016-12-31	2017-05-21	http://review	Positive	null	null	null
1304	Amazon	Music Box	B0002E1G	L. Duffin	[0, 0]	Nice quality	4	This thing i	1358835200	2016-12-31	2017-05-21	http://review	Positive	null	null	null
1305	Amazon	Music Box	B0002E1G	Loren2142	[0, 0]	When I don	5	Really great	1387497600	2016-12-31	2017-05-21	http://review	Positive	null	null	null

Test SQL Qu (100 rows)

Activate Windows Update Cancel

Reasoner active Show Inferences

Figure 8. Output of Music Box

4.5 Organ Pipes

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The Output of Organ Pipes is shown below figure 9.

Mapping ID: MAPID:16162158c00413b2e8852c0ee1a3

ID	Manufacturer	Type	asin	reviewerId	helpful	reviewText	Rating	summary	unixReview	reviewdate	reviewdates	reviewscore	Opinion	FIELD15	FIELD16	FIELD17
510	Amazon	Organ pipes	B0002CZV...	Rock from W...	[1, 1]	It's a good b...	4	It's a capo...	1399334400	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
511	Amazon	Organ pipes	B0002CZV...	SJ Huley	[0, 0]	You can nev...	5	Koyer is th...	1334534400	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
512	Amazon	Organ pipes	B0002CZV...	Urah Rose	[0, 0]	I've been us...	5	One of the b...	1340150400	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
513	Amazon	Organ pipes	B0002CZV...	Victoria	[0, 2]	This is suc...	5	Couldn't As...	1399248000	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
514	Amazon	Organ pipes	B0002CZV...	acofbase	[0, 0]	These are t...	5	Best Strap...	1399039400	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
515	Amazon	Organ pipes	B0002CZV...	Alexander V...	[2, 2]	In particular...	5	Probably th...	1325289600	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
516	Amazon	Organ pipes	B0002CZV...	Amos	[0, 0]	So I brought...	4	They work b...	1375968800	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
517	Amazon	Organ pipes	B0002CZV...	aspiring sal...	[1, 1]	The screws...	4	Does NOT!	1299039400	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
518	Amazon	Organ pipes	B0002CZV...	bacou bob	[0, 0]	yes, if you...	4	work fine b...	1402444800	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
519	Amazon	Organ pipes	B0002CZV...	B. Hood 'al...	[0, 0]	best strap!	5	work great	1357948800	2016-11-17	2017-05-21	http://review...	Positive	null	null	null
520	Amazon	Organ pipes	B0002CZV...	BuytRaphiel	[0, 0]	Almost drop...	5	Life saver	1361923200	2016-11-17	2017-05-21	http://review...	Positive	null	null	null
521	Amazon	Organ pipes	B0002CZV...	blabe	[2, 2]	I tried this...	4	I Prefer Sca...	1289779200	2016-11-17	2017-05-21	http://review...	Positive	null	null	null
522	Amazon	Organ pipes	B0002CZV...	Bill Lewey	[0, 0]	I had to actu...	5	Work Great	1398816000	2016-11-17	2017-05-21	http://review...	Positive	null	null	null
523	Amazon	Organ pipes	B0002CZV...	brman	[0, 0]	These strap...	5	Easy to inst...	1383891200	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
524	Amazon	Organ pipes	B0002CZV...	brman	[0, 0]	I've tried a...	5	By far the b...	1390099600	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
525	Amazon	Organ pipes	B0002CZV...	Chris	[1, 2]	Great prod...	5	Love em	1389942400	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
526	Amazon	Organ pipes	B0002CZV...	Christian F...	[0, 0]	they work w...	5	Nice looks	1304467200	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
527	Amazon	Organ pipes	B0002CZV...	Delta Echo	[0, 0]	no complai...	5	Simple, eas...	1323734400	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
528	Amazon	Organ pipes	B0002CZV...	DeltaGenest...	[4, 4]	After receiv...	4	Gibson Goo...	1301443200	2016-11-16	2017-05-21	http://review...	Positive	null	null	null
529	Amazon	Organ pipes	B0002CZV...	Dyn B	[0, 0]	Very easy to...	5	Easy to inst...	1323216000	2016-11-14	2017-05-21	http://review...	Positive	null	null	null
530	Amazon	Organ pipes	B0002CZV...	Don 'On Th...	[0, 0]	This produc...	5	Want secur...	1364063200	2016-11-14	2017-05-21	http://review...	Positive	null	null	null
531	Amazon	Organ pipes	B0002CZV...	D.T.	[0, 0]	I have two s...	5	Great Lock...	1395273600	2016-11-13	2017-05-21	http://review...	Positive	null	null	null
532	Amazon	Organ pipes	B0002CZV...	Eric A. Rog...	[0, 0]	It's worth a...	5	An assembl...	1368889400	2016-11-13	2017-05-21	http://review...	Positive	null	null	null
533	Amazon	Organ pipes	B0002CZV...	GaryG	[0, 0]	Oh Yeah, L...	5	Great Buy	1351468800	2016-11-12	2017-05-21	http://review...	Positive	null	null	null
534	Amazon	Organ pipes	B0002CZV...	GeraldParist	[0, 0]	I have had...	5	Sturdy and...	1357862400	2016-11-12	2017-05-21	http://review...	Positive	null	null	null
535	Amazon	Organ pipes	B0002CZV...	Gordy Styles	[0, 0]	these clunk...	5	save your a...	1268208000	2016-11-12	2017-05-21	http://review...	Positive	null	null	null
536	Amazon	Organ pipes	B0002CZV...	GradyKAP	[0, 0]	Very high q...	5	Going to get...	1388893000	2016-11-12	2017-05-21	http://review...	Positive	null	null	null
537	Amazon	Organ pipes	B0002CZV...	Hannah Ba...	[0, 0]	I've had the...	5	you should...	1383436800	2016-11-12	2017-05-21	http://review...	Positive	null	null	null
538	Amazon	Organ pipes	B0002CZV...	Hittespot	[0, 0]	This is the...	5	Working Pe...	1376082800	2016-11-11	2017-05-21	http://review...	Positive	null	null	null
539	Amazon	Organ pipes	B0002CZV...	H.L.B. 'H.L.B.	[0, 0]	What's grea...	4	vastly Sup...	1351123200	2016-11-11	2017-05-21	http://review...	Positive	null	null	null
540	Amazon	Organ pipes	B0002CZV...	IBZANE	[0, 0]	Straprock...	4	Dont know...	1346284800	2016-11-11	2017-05-21	http://review...	Positive	null	null	null
541	Amazon	Organ pipes	B0002CZV...	Jane	[0, 0]	I have never...	5	What a fant...	1392854400	2016-11-11	2017-05-21	http://review...	Positive	null	null	null

Test SQL Qu... (100 rows)

Activate W... Update Cancel

Reasoner active Show Inferences

Figure 9. Output of Organ pipes

4.6 Sicks

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The figure 10 shows the output of Sicks.

Mapping ID: MAPID:98b7c9bcb8842ca9ff7a3b324b14432

ID	Manufacturer	Type	asin	reviewerId	helpful	reviewText	Rating	summary	unixReview	reviewdate	reviewdates	reviewscore	Opinion	FIELD15	FIELD16	FIELD17
775	Amazon	Sicks	B0002D0C...	Bob 'Bob W...	[0, 0]	I've used ex...	5	Torres Pick...	1218672000	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
776	Amazon	Sicks	B0002D0C...	bobby 12333	[0, 0]	I bought the...	5	Great Pick...	1371254400	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
777	Amazon	Sicks	B0002D0C...	Brian	[0, 0]	Love these...	5	Torres Pick...	1300089600	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
778	Amazon	Sicks	B0002D0C...	Cesar Aug...	[0, 0]	I've always...	5	Great price	1354147200	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
779	Amazon	Sicks	B0002D0C...	Chavis Perez	[0, 0]	I know that...	5	Cool	1391840000	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
780	Amazon	Sicks	B0002D0C...	Chris0542	[0, 0]	I use Durfo...	5	Just right b...	1368534400	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
781	Amazon	Sicks	B0002D0C...	Chris	[0, 0]	I've seen us...	5	pick of the...	1295097600	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
782	Amazon	Sicks	B0002D0C...	David Y.	[0, 0]	Great pick...	5	Good all th...	1389016000	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
783	Amazon	Sicks	B0002D0C...	D. Jones 'T...	[1, 1]	I think Tor...	5	Great pick...	129907200	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
784	Amazon	Sicks	B0002D0C...	D. Villala 'p...	[0, 0]	I've been a...	5	My favorite...	1354838400	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
785	Amazon	Sicks	B0002D0C...	Evanora	[0, 0]	I like the p...	5	Great	1362708800	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
786	Amazon	Sicks	B0002D0C...	From Detroit	[1, 1]	Yes. The 1...	5	Blue Torres	1255737600	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
787	Amazon	Sicks	B0002D0C...	GamerBoy	[1, 1]	Whatever...	5	My Favorite	1347753600	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
788	Amazon	Sicks	B0002D0C...	Gordy Styles	[0, 0]	I've always...	5	great pick!	1358208000	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
789	Amazon	Sicks	B0002D0C...	Hagen Lall...	[0, 0]	I've been pl...	2	Not the Vir...	1402358400	2017-03-17	2017-04-03	http://review...	Negative	null	null	null
790	Amazon	Sicks	B0002D0C...	Hannah Ba...	[0, 0]	thundrily...	5	great pick...	1383436800	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
791	Amazon	Sicks	B0002D0C...	Hurley 'I th...	[0, 0]	I was lookin...	5	very stardy...	1291075200	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
792	Amazon	Sicks	B0002D0C...	J.C.	[1, 1]	I've been us...	5	Picks	1395187200	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
793	Amazon	Sicks	B0002D0C...	Jean Hann...	[0, 0]	I love these...	5	Favorite pick	1361232000	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
794	Amazon	Sicks	B0002D0C...	Jeffrey A. H...	[0, 0]	If you don't...	5	Good Pick...	1388448000	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
795	Amazon	Sicks	B0002D0C...	Joeboris	[0, 0]	Good pick...	4	Good pick...	1314318800	2017-03-17	2017-04-03	http://review...	Positive	null	null	null
796	Amazon	Sicks	B0002D0C...	Jon S	[0, 0]	I used to us...	5	Just about...	1379378600	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
797	Amazon	Sicks	B0002D0C...	Jorge Bar...	[0, 0]	If you thou...	5	Quality	1351608000	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
798	Amazon	Sicks	B0002D0C...	JuanRidaz	[0, 0]	Finally deci...	5	Great pick...	1291075200	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
799	Amazon	Sicks	B0002D0C...	Kazmir	[0, 0]	I think these...	5	Always us...	1403088000	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
800	Amazon	Sicks	B0002D0C...	Mark Burge...	[0, 0]	I've used th...	5	If you need...	1386288000	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
801	Amazon	Sicks	B0002D0C...	Mark R. Seg...	[0, 0]	In a fit of b...	5	Still the best	1357889600	2017-03-16	2017-04-03	http://review...	Positive	null	null	null
802	Amazon	Sicks	B0002D0C...	M. M. Jack...	[0, 0]	These will p...	5	Nice, seri...	1334620800	2017-03-16	2017-03-27	http://review...	Positive	null	null	null
803	Amazon	Sicks	B0002D0C...	Moe	[0, 0]	I like it. Gri...	5	Simply good	1358121600	2017-03-16	2017-03-27	http://review...	Positive	null	null	null
804	Amazon	Sicks	B0002D0C...	MojoMJojo	[0, 0]	Torres is gr...	5	excellent	1402099200	2017-03-15	2017-03-27	http://review...	Positive	null	null	null
805	Amazon	Sicks	B0002D0C...	Mr. GrThang	[0, 0]	The thicke...	5	My favorite!	1372204800	2017-03-15	2017-03-27	http://review...	Positive	null	null	null

Test SQL Qu... (100 rows)

Activate W... Update Cancel

Reasoner active Show Inferences

Figure 10. Output of Sicks

4.7 Singing Tube

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The figure 11 illustrate the output of Singing Tube.

Mapping ID: MAP01-787632323044918425626182344787																	
ID	Manufacturer	Type	asin	reviewerId	helpful	reviewText	Rating	summary	unixReview	reviewdate	reviewdate	reviewdate	reviewdate	Opinion	FIELD15	FIELD16	FIELD17
875	Amazon	Singing tube	B0002D0C8K	Kameed	11, 11	This pick is...	4	Good for \$5...	1379220000	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
876	Amazon	Singing tube	B0002D0C8K	Mrs. Smith	10, 11	Since they...	3	Gator Grip?	1364428800	2017-02-15	2017-05-21	http://review	Neutral	null	null	null	null
877	Amazon	Singing tube	B0002D0C8K	RPunk2	10, 01	Contrast...	4	I'm glad I b...	1363218200	2017-03-18	2017-05-21	http://review	Positive	null	null	null	null
878	Amazon	Singing tube	B0002D0C8K	R. Heslin	10, 01	These have...	4	Love these	1369520800	2017-03-16	2017-05-21	http://review	Positive	null	null	null	null
879	Amazon	Singing tube	B0002D0C8K	Myf J. Green	10, 11	I started doi...	3	So-so	1364774400	2017-03-19	2017-05-21	http://review	Neutral	null	null	null	null
880	Amazon	Singing tube	B0002D0C8K	Walter S. E...	10, 01	I've been try...	4	Worth a try	1375315200	2017-03-12	2017-05-21	http://review	Positive	null	null	null	null
881	Amazon	Singing tube	B0002D0C8K	AF. Vhuga	12, 12	For a hole i...	3	Good & usef...	1315440000	2017-03-18	2017-05-21	http://review	Neutral	null	null	null	null
882	Amazon	Singing tube	B0002D0C8K	Amazon C...	10, 01	I got three...	5	Great (not	1368428800	2017-03-18	2017-05-21	http://review	Positive	null	null	null	null
883	Amazon	Singing tube	B0002D0C8K	Baker88	13, 41	So, these p...	3	These are	1327104000	2017-03-18	2017-05-21	http://review	Neutral	null	null	null	null
884	Amazon	Singing tube	B0002D0C8K	chinnakali	10, 01	I always fin...	4	Very good s...	1332028800	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
885	Amazon	Singing tube	B0002D0C8K	O. Quinn D...	12, 12	These pick...	5	Love these	1298505600	2017-02-11	2017-05-21	http://review	Positive	null	null	null	null
886	Amazon	Singing tube	B0002D0C8K	QasabAbd	11, 12	I don't know...	3	Shitty is it	1338104000	2017-03-11	2017-05-21	http://review	Neutral	null	null	null	null
887	Amazon	Singing tube	B0002D0C8K	Frank Jorda	10, 01	Looking for...	3	OK	1369552000	2017-03-10	2017-05-21	http://review	Neutral	null	null	null	null
888	Amazon	Singing tube	B0002D0C8K	Fredrick B...	13, 15	The thing a...	3	Small, hard...	1230540800	2017-03-10	2017-05-21	http://review	Neutral	null	null	null	null
889	Amazon	Singing tube	B0002D0C8K	Hagen Lebr	10, 01	I don't fin...	5	Perfect Pick	1367843200	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
890	Amazon	Singing tube	B0002D0C8K	J. Edgar M...	13, 12	If you're w...	5	Thick, eas...	1375633600	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
891	Amazon	Singing tube	B0002D0C8K	Joshua C...	12, 21	When I hear...	5	Amazing P...	1250480000	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
892	Amazon	Singing tube	B0002D0C8K	KP	10, 01	I have them...	5	Love these!	1363132800	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
893	Amazon	Singing tube	B0002D0C8K	Marc	12, 21	These pick...	4	Superb gu...	1289088000	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
894	Amazon	Singing tube	B0002D0C8K	Michael W...	10, 01	Currently m...	6	My favo...	1363604800	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
895	Amazon	Singing tube	B0002D0C8K	Molten R...	13, 41	I don't know...	5	Wow, fin...	1327838400	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
896	Amazon	Singing tube	B0002D0C8K	MocMoc99	11, 11	another fin...	1	by long	1402092800	2017-03-10	2017-05-21	http://review	Negative	null	null	null	null
897	Amazon	Singing tube	B0002D0C8K	Peter Heib	10, 01	The right pi...	3	Good pick n...	1373241600	2017-03-10	2017-05-21	http://review	Neutral	null	null	null	null
898	Amazon	Singing tube	B0002D0C8K	Rick Morton	11, 11	I bought the...	5	Lemon Situ...	1367508800	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
899	Amazon	Singing tube	B0002D0C8K	Solacefor	10, 01	I bought my...	5	More sure	1265891200	2017-03-10	2017-05-21	http://review	Positive	null	null	null	null
900	Amazon	Singing tube	B0002D0C8K	Sure Nym	10, 01	I've been us...	4	My Ling T...	1310880000	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
901	Amazon	Singing tube	B0002D0C8K	twice	10, 01	How a puta...	5	this pick hel...	1377302400	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
902	Amazon	Singing tube	B0002D0C8K	Travor	10, 01	Using the st...	5	Can't use a...	1381552000	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
903	Amazon	Singing tube	B0002D0C8K	Audie	10, 01	I use often...	5	Desktop Jaz...	1369782400	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
904	Amazon	Singing tube	B0002D0C8K	Cherish M...	10, 01	As a beginn...	5	Never Use...	1357888000	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
905	Amazon	Singing tube	B0002D0C8K	Cherish M...	10, 01	I've been pi...	5	Give em a...	1320405400	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null
906	Amazon	Singing tube	B0002D0C8K	Cherish M...	10, 01	Good more b...	4	Good Pick	1366194000	2017-03-11	2017-05-21	http://review	Positive	null	null	null	null

Test SQL Qu... (100 rows)

Activate Windows
Go to Settings to activate Windows.

UpdateCancel

Remember actionsShow information

Figure 11. Output of Singing Tube

4.8 Siren Disk

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The Output of Siren Disk is shown below figure 12.

Mapping ID: MAP02-B420N71dc144f39be838365ceeb968

ID	Manufacturer	Type	asin	reviewerId	helpful	reviewText	Rating	summary	unixReview	reviewdate	reviewdate	reviewdate	reviewdate	Opinion	FIELD15	FIELD16	FIELD17
1014	Amazon	Siren disk	B0002D0E85	Andrew	11, 11	Vern good s...	5	Awesome s...	1339545600	2017-02-24	2017-05-21	http://review	Positive	null	null	null	
1015	Amazon	Siren disk	B0002D0E85	AndrDob	10, 01	Good strapp...	5	Perfect for	1384409600	2017-02-24	2017-05-21	http://review	Positive	null	null	null	
1016	Amazon	Siren disk	B0002D0E85	AT	11, 11	I needed a...	5	Great	1369454400	2017-02-24	2017-05-21	http://review	Positive	null	null	null	
1017	Amazon	Siren disk	B0002D0E85	AWB	10, 01	A very good...	5	I love it	1388297600	2017-02-24	2017-05-21	http://review	Positive	null	null	null	
1018	Amazon	Siren disk	B0002D0E85	B Hood "al	10, 01	perfect size...	5	great for us...	1365120000	2017-02-24	2017-05-21	http://review	Positive	null	null	null	
1019	Amazon	Siren disk	B0002D0E85	Brynn	11, 11	I was disap...	5	Great	1357689600	2017-02-24	2017-05-21	http://review	Positive	null	null	null	
1020	Amazon	Siren disk	B0002D0E85	D. Howard	10, 01	A nice simp...	5	At this price	1387756800	2017-02-16	2017-05-21	http://review	Positive	null	null	null	
1021	Amazon	Siren disk	B0002D0E85	D. Lindach	10, 01	It's comfort...	4	Nothing fa...	1376438400	2017-02-15	2017-05-21	http://review	Positive	null	null	null	
1022	Amazon	Siren disk	B0002D0E85	D. Oliver	10, 01	For the mo...	5	Great Guita...	1392336000	2017-02-15	2017-05-21	http://review	Positive	null	null	null	
1023	Amazon	Siren disk	B0002D0E85	G. Botta	10, 01	I've only us...	4	Basic strap	1397520000	2017-02-15	2017-05-21	http://review	Positive	null	null	null	
1024	Amazon	Siren disk	B0002D0E85	GeekParrot	10, 01	This is just...	5	Simple, ea...	1357862400	2017-02-15	2017-05-21	http://review	Positive	null	null	null	
1025	Amazon	Siren disk	B0002D0E85	Gordy Styles	12, 21	I've always...	5	the best str...	1358208000	2017-02-14	2017-05-21	http://review	Positive	null	null	null	
1026	Amazon	Siren disk	B0002D0E85	Hannah Ba...	10, 01	I've had this...	5	Great strap...	1383436800	2017-02-14	2017-05-21	http://review	Positive	null	null	null	
1027	Amazon	Siren disk	B0002D0E85	Henry W.	10, 01	For at great...	5	Great Strap...	1372032000	2017-02-14	2017-05-21	http://review	Positive	null	null	null	
1028	Amazon	Siren disk	B0002D0E85	ja	11, 11	What you s...	4	Call me the...	1353688000	2017-02-16	2017-05-21	http://review	Positive	null	null	null	
1029	Amazon	Siren disk	B0002D0E85	Jerome Ve...	10, 01	Made of su...	5	basic strap	1365120000	2017-02-19	2017-05-21	http://review	Positive	null	null	null	
1030	Amazon	Siren disk	B0002D0E85	Jerry	10, 01	Great inap...	5	Great inap...	1390608000	2017-02-19	2017-05-21	http://review	Positive	null	null	null	
1031	Amazon	Siren disk	B0002D0E85	Joethoré	10, 01	A very attrac...	5	Just what I...	1390788800	2017-02-19	2017-05-21	http://review	Positive	null	null	null	
1032	Amazon	Siren disk	B0002D0E85	John	10, 01	this is a gre...	5	long and sh...	1308096000	2017-02-18	2017-05-21	http://review	Positive	null	null	null	
1033	Amazon	Siren disk	B0002D0E85	Kev	10, 01	Great build...	5	Awsome s...	1377216000	2017-02-18	2017-05-21	http://review	Positive	null	null	null	
1034	Amazon	Siren disk	B0002D0E85	Kodack	10, 01	Cheaply m...	3	cheap	1365510400	2017-02-18	2017-05-21	http://review	Neutral	null	null	null	
1035	Amazon	Siren disk	B0002D0E85	Kraigbura	11, 21	I really dis...	5	A Basic Gui...	1329955200	2017-02-18	2017-05-21	http://review	Positive	null	null	null	
1036	Amazon	Siren disk	B0002D0E85	LuckyStar	10, 01	I like purple...	4	Strap for th...	1385251200	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1037	Amazon	Siren disk	B0002D0E85	Lyfe3891	11, 21	this makes...	5	great strap	1322008400	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1038	Amazon	Siren disk	B0002D0E85	Marlin Bro...	10, 01	So very we...	5	Ernie Ball S...	1374105600	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1039	Amazon	Siren disk	B0002D0E85	Mark A Will...	10, 01	Got three of...	4	Great strap	1398432000	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1040	Amazon	Siren disk	B0002D0E85	Mike Lovell	10, 01	This is a ve...	5	Ernie Ball G...	1398432000	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1041	Amazon	Siren disk	B0002D0E85	mt	11, 11	Product de...	5	Great, chea...	1317889600	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1042	Amazon	Siren disk	B0002D0E85	Paula Galla...	11, 21	I have both...	5	Well made...	1317889600	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1043	Amazon	Siren disk	B0002D0E85	Quasiklat	10, 01	Nothing ap...	3	Nothing sp...	1365796800	2017-02-16	2017-05-21	http://review	Neutral	null	null	null	
1044	Amazon	Siren disk	B0002D0E85	Roger M. B...	10, 01	Finally I h...	5	A long Strap!	1372723200	2017-02-17	2017-05-21	http://review	Positive	null	null	null	
1045	Amazon	Siren disk	B0002D0E85	Rojambo	10, 01	the hole at...	3	regular	1384409600	2017-02-17	2017-05-21	http://review	Neutral	null	null	null	
1046	Amazon	Siren disk	B0002D0E85	Roy Kansen	10, 01	I'm sure g...	4	Strap	1399046400	2017-02-17	2017-05-21	http://review	Positive	null	null	null	

Test SQL Qu... (100 rows)

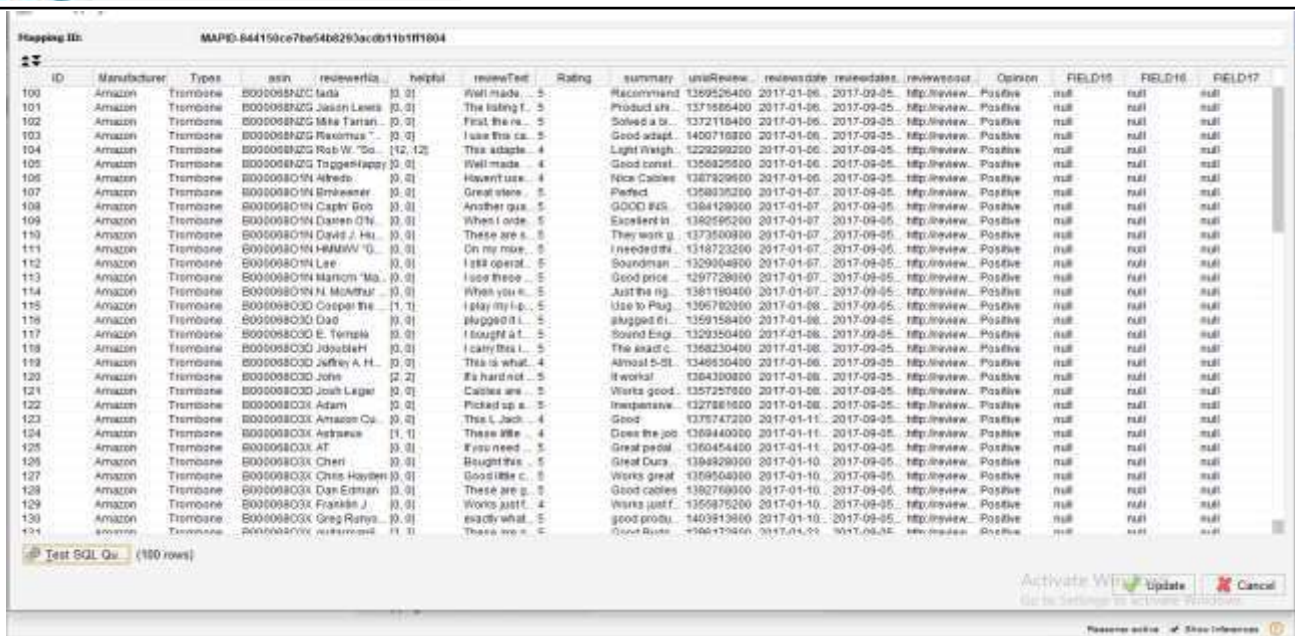
Activate Windows
Go to Settings to activate Windows.

UpdateCancel

Figure 12. Output of Siren Disk

4.9 Trombone

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The figure 13 illustrate the output of Trombone.

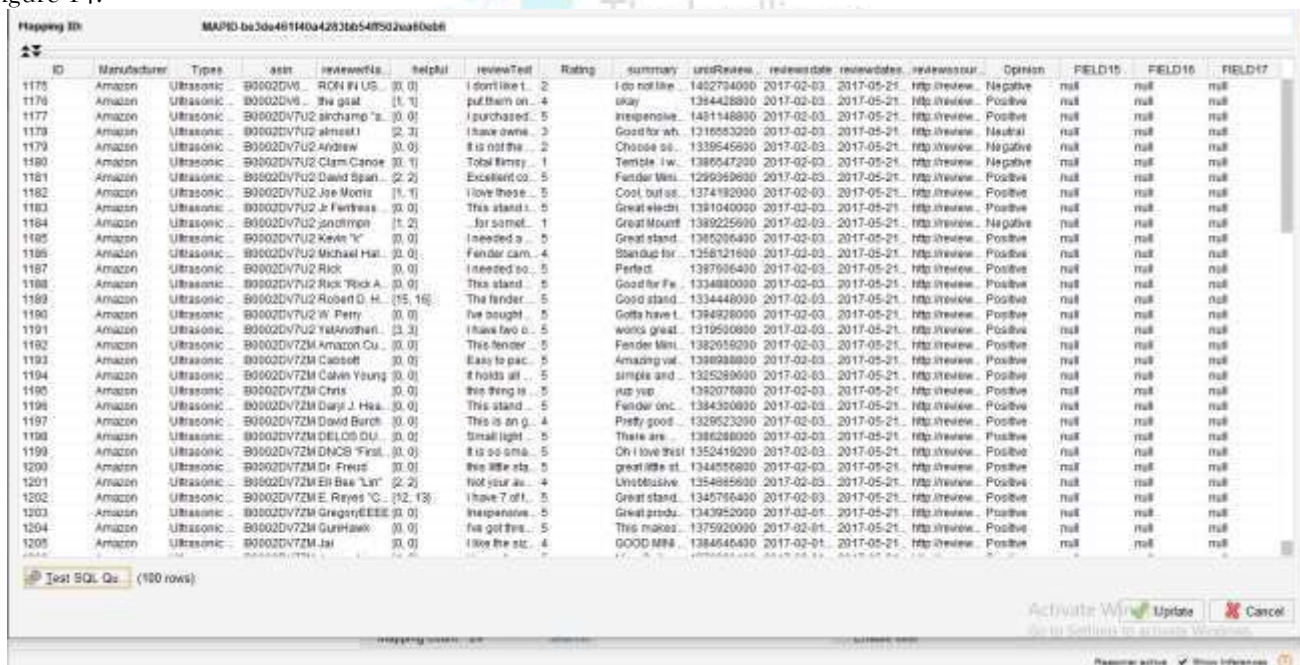


ID	Manufacturer	Types	asin	reviewTitle	helpful	reviewText	Rating	summary	userReview	reviewDate	reviewDate	reviewScore	Opinion	FIELD15	FIELD16	FIELD17
100	Amazon	Trombone	B00008BNZC	Jada	[0, 0]	Well made	5	Recommend	1369526400	2017-01-06	2017-03-05	http://review	Positive	null	null	null
101	Amazon	Trombone	B00008BNZG	Jason Lewis	[0, 0]	The latest f	5	Product sh	1371686400	2017-01-06	2017-09-05	http://review	Positive	null	null	null
102	Amazon	Trombone	B00008BNZG	Mike Tarran	[0, 0]	First the re	5	Solved a bi	1372118400	2017-01-06	2017-09-05	http://review	Positive	null	null	null
103	Amazon	Trombone	B00008BNZG	Rebecca T	[0, 0]	I use the ca	5	Good adapt	1400716800	2017-01-06	2017-09-05	http://review	Positive	null	null	null
104	Amazon	Trombone	B00008BNZG	Rob W. Co	[12, 12]	This adapte	4	Light weigh	1322929200	2017-01-06	2017-09-05	http://review	Positive	null	null	null
105	Amazon	Trombone	B00008BNZG	TriggleHapp	[0, 0]	Well made	4	Good contr	1350825600	2017-01-06	2017-09-05	http://review	Positive	null	null	null
106	Amazon	Trombone	B00008BNZG	Alfredo	[0, 0]	Haven't use	4	Nice Cables	1367829600	2017-01-06	2017-09-05	http://review	Positive	null	null	null
107	Amazon	Trombone	B00008BNZG	Emmanuel	[0, 0]	Great wire	5	Perfect	1358332800	2017-01-07	2017-09-05	http://review	Positive	null	null	null
108	Amazon	Trombone	B00008BNZG	Caply Bob	[0, 0]	Another gas	5	GOOD FAS	1364128000	2017-01-07	2017-09-05	http://review	Positive	null	null	null
109	Amazon	Trombone	B00008BNZG	Darren G.N	[0, 0]	When I ord	5	Excellent i	1362095200	2017-01-07	2017-09-05	http://review	Positive	null	null	null
110	Amazon	Trombone	B00008BNZG	Davis J. Hu	[0, 0]	These are	5	They work g	1373500800	2017-01-07	2017-09-05	http://review	Positive	null	null	null
111	Amazon	Trombone	B00008BNZG	HMMW T	[0, 0]	On my moe	5	I need to th	1316723200	2017-01-07	2017-09-05	http://review	Positive	null	null	null
112	Amazon	Trombone	B00008BNZG	Lae	[0, 0]	I get operat	5	Soundman	1329004800	2017-01-07	2017-09-05	http://review	Positive	null	null	null
113	Amazon	Trombone	B00008BNZG	Manon Ma	[0, 0]	I use these	5	Good price	1367728000	2017-01-07	2017-09-05	http://review	Positive	null	null	null
114	Amazon	Trombone	B00008BNZG	H. Moutur	[0, 0]	When you h	5	Just the rig	1361180400	2017-01-07	2017-09-05	http://review	Positive	null	null	null
115	Amazon	Trombone	B00008BNZG	Cooper the	[1, 1]	I play my f	5	Use to Plug	1365782000	2017-01-08	2017-09-05	http://review	Positive	null	null	null
116	Amazon	Trombone	B00008BNZG	Dad	[0, 0]	plugged it	5	glugged it	1359158400	2017-01-08	2017-09-05	http://review	Positive	null	null	null
117	Amazon	Trombone	B00008BNZG	E. Temple	[0, 0]	I bought a f	5	Sound Eng	1329350400	2017-01-08	2017-09-05	http://review	Positive	null	null	null
118	Amazon	Trombone	B00008BNZG	JodyBleH	[0, 0]	I carry this	5	The exact c	1368230400	2017-01-08	2017-09-05	http://review	Positive	null	null	null
119	Amazon	Trombone	B00008BNZG	Jeffrey A. H.	[0, 0]	This is what	4	Almost 5-st	1348530400	2017-01-08	2017-09-05	http://review	Positive	null	null	null
120	Amazon	Trombone	B00008BNZG	John	[2, 2]	It's hard not	5	It works	1364300800	2017-01-08	2017-09-05	http://review	Positive	null	null	null
121	Amazon	Trombone	B00008BNZG	Josh Lajal	[0, 0]	Cables are	5	Works good	1357257600	2017-01-08	2017-09-05	http://review	Positive	null	null	null
122	Amazon	Trombone	B00008BNZG	Adam	[0, 0]	Picked up	5	Inexpensiv	1327881600	2017-01-08	2017-09-05	http://review	Positive	null	null	null
123	Amazon	Trombone	B00008BNZG	Amazon Cu	[0, 0]	This is Jack	4	Good	1375747200	2017-01-11	2017-09-05	http://review	Positive	null	null	null
124	Amazon	Trombone	B00008BNZG	Ardaya	[1, 1]	These little	4	Good the job	1369440000	2017-01-11	2017-09-05	http://review	Positive	null	null	null
125	Amazon	Trombone	B00008BNZG	AT	[0, 0]	If you need	5	Great prod	1360454400	2017-01-11	2017-09-05	http://review	Positive	null	null	null
126	Amazon	Trombone	B00008BNZG	Cheri	[0, 0]	Bought this	5	Great Dura	1368928000	2017-01-10	2017-09-05	http://review	Positive	null	null	null
127	Amazon	Trombone	B00008BNZG	Chris Hayden	[0, 0]	Good little c	5	Works great	1359504000	2017-01-10	2017-09-05	http://review	Positive	null	null	null
128	Amazon	Trombone	B00008BNZG	Dan Edman	[0, 0]	These are g	5	Good cables	1362769600	2017-01-10	2017-09-05	http://review	Positive	null	null	null
129	Amazon	Trombone	B00008BNZG	Franklin J	[0, 0]	Works just f	4	Works just f	1355875200	2017-01-10	2017-09-05	http://review	Positive	null	null	null
130	Amazon	Trombone	B00008BNZG	Greg Rattay	[0, 0]	exactly what	5	Good produ	1403913600	2017-01-10	2017-09-05	http://review	Positive	null	null	null
131	Amazon	Trombone	B00008BNZG	restmond	[1, 1]	These are	5	Good produ	1360454400	2017-01-10	2017-09-05	http://review	Positive	null	null	null

Figure13. Output of Trombone

4.10 Ultrasonic Receiver

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The Output of Ultrasonic Receiver is shown in figure 14.



ID	Manufacturer	Types	asin	reviewTitle	helpful	reviewText	Rating	summary	userReview	reviewDate	reviewDate	reviewScore	Opinion	FIELD15	FIELD16	FIELD17
1175	Amazon	Ultrasonic	B0002DV6	RON H US	[0, 0]	I don't like i	2	I do not like	1402794000	2017-02-03	2017-05-21	http://review	Negative	null	null	null
1176	Amazon	Ultrasonic	B0002DV6	the gal	[1, 1]	put them on	4	okay	1364428800	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1177	Amazon	Ultrasonic	B0002DV7U2	srchomp'a	[0, 0]	I purchased	5	Inexpensiv	1401148800	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1178	Amazon	Ultrasonic	B0002DV7U2	ahmeti	[2, 3]	I have own	2	Good for wh	1216583200	2017-02-03	2017-05-21	http://review	Neutral	null	null	null
1179	Amazon	Ultrasonic	B0002DV7U2	Andrew	[0, 0]	It is not the	2	Choose so	1339545600	2017-02-03	2017-05-21	http://review	Negative	null	null	null
1180	Amazon	Ultrasonic	B0002DV7U2	Clam Canoe	[0, 1]	Totally terr	1	Temple i w	1386047200	2017-02-03	2017-05-21	http://review	Negative	null	null	null
1181	Amazon	Ultrasonic	B0002DV7U2	David Span	[2, 2]	Excellent co	5	Fender Mini	1299369600	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1182	Amazon	Ultrasonic	B0002DV7U2	Joe Morris	[1, 1]	I love these	5	Cool, but as	1374192000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1183	Amazon	Ultrasonic	B0002DV7U2	J. Fawkes	[0, 0]	This stand	5	Great elect	1361040000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1184	Amazon	Ultrasonic	B0002DV7U2	andromp	[1, 2]	For some	1	Great Mount	1389225600	2017-02-03	2017-05-21	http://review	Negative	null	null	null
1185	Amazon	Ultrasonic	B0002DV7U2	Kevin K	[0, 0]	I needed a	5	Great stand	1380304000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1186	Amazon	Ultrasonic	B0002DV7U2	Michael Hal	[0, 0]	Fender cam	4	Stand due f	1358121600	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1187	Amazon	Ultrasonic	B0002DV7U2	Rick	[0, 0]	I needed so	5	Perfect	1367966400	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1188	Amazon	Ultrasonic	B0002DV7U2	Rock Rick A	[0, 0]	This stand	5	Good for Fi	1334880000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1189	Amazon	Ultrasonic	B0002DV7U2	Robert G. H.	[15, 16]	The fender	5	Good stand	1334448000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1190	Amazon	Ultrasonic	B0002DV7U2	W. Perry	[0, 0]	I've bought	5	Gotta have i	1384928000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1191	Amazon	Ultrasonic	B0002DV7U2	Valanthari	[3, 3]	I have two	5	works great	1319508800	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1192	Amazon	Ultrasonic	B0002DV7ZM	Amazon Cu	[0, 0]	The fender	5	Fender Mini	1382052000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1193	Amazon	Ultrasonic	B0002DV7ZM	Cassett	[0, 0]	Easy to pac	5	Amazing val	1386938800	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1194	Amazon	Ultrasonic	B0002DV7ZM	Calvin Young	[0, 0]	it holds all	5	simple and	1325289600	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1195	Amazon	Ultrasonic	B0002DV7ZM	Chris	[0, 0]	the thing is	5	top yep	1392076800	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1196	Amazon	Ultrasonic	B0002DV7ZM	Daryl J. Ha	[0, 0]	This stand	5	Fender inc	1384350800	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1197	Amazon	Ultrasonic	B0002DV7ZM	David Burch	[0, 0]	This is an g	4	Pretty good	1328523200	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1198	Amazon	Ultrasonic	B0002DV7ZM	DELOS DU	[0, 0]	It's small li	5	There are	1386288000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1199	Amazon	Ultrasonic	B0002DV7ZM	DNCS "First	[0, 0]	It is so sma	5	Oh I love the	1352419200	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1200	Amazon	Ultrasonic	B0002DV7ZM	Dr. Freuz	[0, 0]	the little sta	5	great little st	1344576800	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1201	Amazon	Ultrasonic	B0002DV7ZM	Elie Ben "Lin	[2, 2]	Not your su	4	Unobtrusiv	1354856000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1202	Amazon	Ultrasonic	B0002DV7ZM	Reyes C.	[12, 13]	I have 7 of	5	Great stand	1340756400	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1203	Amazon	Ultrasonic	B0002DV7ZM	Gregory DEEE	[0, 0]	Inexpensiv	5	Great produ	1349529600	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1204	Amazon	Ultrasonic	B0002DV7ZM	GunHawk	[0, 0]	I've got the	5	This makes	1375920000	2017-02-03	2017-05-21	http://review	Positive	null	null	null
1205	Amazon	Ultrasonic	B0002DV7ZM	Jai	[0, 0]	I like the st	4	GOOD MPF	1384646400	2017-02-03	2017-05-21	http://review	Positive	null	null	null

Figure 14. Output of Ultrasonic Receiver

4.11 Ultrasonic Xylophone

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The Output of Ultrasonic Xylophone is shown in figure 15.

MAPIID-bba25c8da75468a4a608059103cd3																
ID	Manufacturer	Type	asin	reviewer	helpful	reviewText	Rating	summary	updatedAt	reviewdate	reviewStatus	reviewerInfo	Option	FELD15	FELD16	FELD17
075	Amazon	Ultrasonic X	B0002D91K4	Team Devil	(0, 0)	Its a light bulb.	5	Tight fit	1377388000	2017-04-14	2017-05-21	http://review	Positive	null	null	null
076	Amazon	Ultrasonic X	B0002D91K4	Janet Davis	(0, 0)	Very nice car.	5	Love it	1384436000	2017-04-14	2017-05-21	http://review	Positive	null	null	null
077	Amazon	Ultrasonic X	B0002D91K4	Janet Davis	(0, 0)	Hello, I love...	5	WHAT YOU	1382198400	2017-04-14	2017-05-21	http://review	Positive	null	null	null
078	Amazon	Ultrasonic X	B0002D91K4	Jaykush	(0, 0)	This case is...	5	Best home f...	1363666000	2017-04-14	2017-05-21	http://review	Positive	null	null	null
079	Amazon	Ultrasonic X	B0002D91K4	W. Perry	(0, 0)	This case is...	5	Very nice ca...	1324876800	2017-04-14	2017-05-21	http://review	Positive	null	null	null
080	Amazon	Ultrasonic X	B0002D91K4	Layman	(0, 0)	I use this fo...	5	Aweome	1330435200	2017-04-14	2017-05-21	http://review	Positive	null	null	null
081	Amazon	Ultrasonic X	B0002D91K4	Matt	(0, 0)	As offered...	5	Worth for m...	1383609600	2017-04-14	2017-05-21	http://review	Positive	null	null	null
082	Amazon	Ultrasonic X	B0002D91K4	Mike Diems	(0, 0)	I bought thi...	5	Perfect Case	1388643200	2017-04-14	2017-05-21	http://review	Positive	null	null	null
083	Amazon	Ultrasonic X	B0002D91K4	MR H4	(0, 0)	I do some g...	5	Epiphone c...	1368211200	2017-04-07	2017-05-21	http://review	Positive	null	null	null
084	Amazon	Ultrasonic X	B0002D91K4	SuperGale	(1, 1)	Could not fi...	5	Great bu...	1391932000	2017-04-07	2017-05-21	http://review	Positive	null	null	null
085	Amazon	Ultrasonic X	B0002D91K4	W. Perry	(0, 0)	It's not muc...	5	Great bu...	1364826000	2017-04-07	2017-05-21	http://review	Positive	null	null	null
086	Amazon	Ultrasonic X	B0002D91	B. T. Cornell	(0, 0)	Ordered on...	5	Nice stuff	1339716400	2017-04-07	2017-05-21	http://review	Positive	null	null	null
087	Amazon	Ultrasonic X	B0002D91	Dan	(0, 0)	If you're lo...	5	Very nice!	1368792000	2017-04-07	2017-05-21	http://review	Positive	null	null	null
088	Amazon	Ultrasonic X	B0002D91	Jared Burd...	(4, 8)	As the title...	5	Great item.	1309048400	2017-04-07	2017-05-21	http://review	Negative	null	null	null
089	Amazon	Ultrasonic X	B0002D91	J. Perry 'Zak'	(1, 1)	This home...	5	Does the job	1360972800	2017-04-07	2017-05-21	http://review	Positive	null	null	null
090	Amazon	Ultrasonic X	B0002D91	Ken K...	(0, 0)	This bag is...	5	Great Givin...	1369336400	2017-04-07	2017-05-21	http://review	Positive	null	null	null
091	Amazon	Ultrasonic X	B0002D91	tdharsh	(0, 0)	This bag is...	5	Big Epphor...	1337777000	2017-04-04	2017-05-21	http://review	Positive	null	null	null
092	Amazon	Ultrasonic X	B0002D91	Mink Pham	(0, 0)	Good quali...	5	Fit my Epp...	1368188800	2017-04-07	2017-05-21	http://review	Positive	null	null	null
093	Amazon	Ultrasonic X	B0002D91	Nancy V. Br...	(1, 1)	This bag is...	5	Provides b...	1389744000	2017-04-07	2017-05-21	http://review	Neutral	null	null	null
094	Amazon	Ultrasonic X	B0002D91	RC6117	(8, 8)	At \$45.00, t...	5	More for Le...	1208096000	2017-04-07	2017-05-21	http://review	Positive	null	null	null
095	Amazon	Ultrasonic X	B0002D91PY	Christopher	(0, 0)	Regrets, r...	5	Best monie...	1368640000	2017-04-07	2017-05-21	http://review	Positive	null	null	null
096	Amazon	Ultrasonic X	B0002D91PY	Eustad	(0, 0)	I got this f...	5	Does what I...	1340502400	2017-04-07	2017-05-21	http://review	Positive	null	null	null
097	Amazon	Ultrasonic X	B0002D91PY	Jerry	(0, 0)	I got this f...	5	Got this fo...	1360696000	2017-04-07	2017-05-21	http://review	Negative	null	null	null
098	Amazon	Ultrasonic X	B0002D91PY	Julian	(0, 0)	No problem...	5	Good	1309852800	2017-04-07	2017-04-06	http://review	Positive	null	null	null
099	Amazon	Ultrasonic X	B0002D91PY	Ken B...	(1, 1)	It works	5	It works	1372988400	2017-04-07	2017-04-06	http://review	Positive	null	null	null
100	Amazon	Ultrasonic X	B0002D91PY	Uly Davis	(0, 0)	I could not...	5	I bought th...	1364233600	2017-04-06	2017-04-06	http://review	Positive	null	null	null
721	Amazon	Ultrasonic X	B0002D91PY	The Pocket	(0, 0)	Not satis...	5	Have a bu...	1361248000	2017-04-06	2017-04-06	http://review	Positive	null	null	null
722	Amazon	Ultrasonic X	B0002D91PY	Aurora	(23, 28)	Synthesiz...	5	This will m...	1376006400	2017-04-01	2017-04-01	http://review	Positive	null	null	null
703	Amazon	Ultrasonic X	B0002D91PY	Charles Fox	(1, 1)	First off, I...	5	Absolutely a...	1360979200	2017-04-01	2017-04-01	http://review	Positive	null	null	null
704	Amazon	Ultrasonic X	B0002D91PY	Fletcher Ch...	(2, 2)	This is NOT...	4	This review	1387779200	2017-04-01	2017-04-06	http://review	Positive	null	null	null
705	Amazon	Ultrasonic X	B0002D91PY	Linda S. Fra...	(1, 1)	Is it my son...	5	Great Guita...	1374537200	2017-04-01	2017-04-05	http://review	Positive	null	null	null
706	Amazon	Ultrasonic X	B0002D91PY	Paula Dow	(28, 28)	But this is...	5	WOW!!!!!!	1374616000	2017-04-01	2017-04-01	http://review	Positive	null	null	null

Test SQL Cu... (100 rows)

Activate Windows Update Cancel

Report Abuse... Show Information

Figure 15. Ultrasonic Xylophone

4.12 Xylophone

After developing Ontology in Protégé, we created mapping, applied inference based semantic rules and got the results from Reasoner to distinguish between positive and negative reviews. The figure 16 shows the Output of Xylophone.

ID
 Manufacturer
 Types
 asin
 reviewerID
 helpful
 reviewText
 Rating
 summary
 unixReview
 reviewdate
 revieweddate
 reviewerLoc
 Opinion
 FIELD15
 FIELD16
 FIELD17

200	Amazon	Xylophone	B0000AQR	Lee	[0, 1]	I use this to	4	The old sta	1356048200	2018-12-23	2017-09-05	http://www	Positive	null	null	null
201	Amazon	Xylophone	B0000AQR	Rod W. "So	[5, 10]	Considered a	4	One Half Of	1229126400	2018-12-23	2017-09-05	http://www	Positive	null	null	null
202	Amazon	Xylophone	B0000AQR	Steve	[0, 0]	Use this to	5	Good standard	13014027000	2018-12-23	2017-09-05	http://www	Positive	null	null	null
203	Amazon	Xylophone	B0000AQR		[0, 36]	This mic is a	4	Good mic	1365811200	2018-12-27	2017-09-05	http://www	Positive	null	null	null
204	Amazon	Xylophone	B0000AQR	A. Garcia "A	[0, 0]	I bought thi	5	This Shure i	1389312000	2018-12-27	2017-09-05	http://www	Positive	null	null	null
205	Amazon	Xylophone	B0000AQR	Charles F.	[0, 0]	these are m	5	Shure	1274537600	2018-12-27	2017-09-05	http://www	Positive	null	null	null
206	Amazon	Xylophone	B0000AQR	Clayton A. C	[0, 0]	The indust	5	Industry sta	1387152000	2018-12-27	2017-09-05	http://www	Positive	null	null	null
207	Amazon	Xylophone	B0000AQR	Dale	[2, 4]	It is not a so	4	Good produ	1277795200	2018-12-27	2017-09-05	http://www	Positive	null	null	null
208	Amazon	Xylophone	B0000AQR	David "30	[0, 0]	best mic i	5	best mic i	1361040000	2018-12-26	2017-09-05	http://www	Positive	null	null	null
209	Amazon	Xylophone	B0000AQR	David L. Va	[240, 258]	The first nu	5	Good for v	1147737600	2018-12-26	2017-09-05	http://www	Positive	null	null	null
210	Amazon	Xylophone	B0000AQR	Federico Pa	[0, 0]	secondary p	5	very very sat	1402358400	2018-12-26	2017-09-05	http://www	Positive	null	null	null
211	Amazon	Xylophone	B0000AQR	Hyndberg	[0, 0]	Great 30 se	5	Great all ar	1360022400	2018-12-30	2017-09-05	http://www	Positive	null	null	null
212	Amazon	Xylophone	B0000AQR	Javier Fern	[1, 1]	I've just got	5	Great produ	1200910400	2018-12-30	2017-09-05	http://www	Positive	null	null	null
213	Amazon	Xylophone	B0000AQR	Jaczn52	[1, 1]	no compla	5	Jaczn52	1379116800	2018-12-30	2017-09-05	http://www	Positive	null	null	null
214	Amazon	Xylophone	B0000AQR	Joyfulwinger	[0, 0]	A nice addit	5	Quality all a	1356392800	2018-12-30	2017-09-05	http://www	Positive	null	null	null
215	Amazon	Xylophone	B0000AQR	Lee	[0, 0]	This mic wo	4	Good all ar	1359004800	2018-12-30	2017-09-05	http://www	Positive	null	null	null
216	Amazon	Xylophone	B0000AQR	Li "Amazon	[0, 38]	I bought two	4	Good	1396509600	2018-12-30	2017-09-05	http://www	Positive	null	null	null
217	Amazon	Xylophone	B0000AQR	Rob W. "So	[2, 5]	In the immo	4	Taiwan A Lic	1292126400	2018-12-30	2017-09-05	http://www	Positive	null	null	null
218	Amazon	Xylophone	B0000AQR	Samuel Chel	[19, 21]	I made the	5	A Shure Set	1245110400	2018-12-30	2017-09-05	http://www	Positive	null	null	null
219	Amazon	Xylophone	B0000AQR	Sharon	[0, 0]	There are st	4	Industry sta	1376203200	2018-12-31	2017-09-05	http://www	Positive	null	null	null
220	Amazon	Xylophone	B0000AQR	Tom "Chic	[0, 0]	The mic is	4	Good mic	1305811200	2018-12-30	2017-09-05	http://www	Positive	null	null	null
221	Amazon	Xylophone	B0001850	softbabe	[1, 1]	This is a ve	5	Good value	1006872000	2018-12-30	2017-09-05	http://www	Positive	null	null	null
222	Amazon	Xylophone	B0001850	Bobby W	[0, 0]	Didn't know	5	Good cable	1303257600	2018-12-30	2017-09-05	http://www	Positive	null	null	null
223	Amazon	Xylophone	B0001850	C.E. "Frank"	[0, 0]	I use this ca	4	Works as is	1212574400	2018-12-30	2017-09-05	http://www	Positive	null	null	null
224	Amazon	Xylophone	B0001850	Dan	[0, 0]	Received thi	1	DIED after 4	1356244800	2018-12-30	2017-09-05	http://www	Negative	null	null	null
225	Amazon	Xylophone	B0001850	Don Edman	[0, 0]	These thing	1	Crap	1382788800	2018-12-30	2017-09-05	http://www	Negative	null	null	null
226	Amazon	Xylophone	B0001850	Chris G	[0, 0]	Pay a compa	4	Does the jo	1381804000	2018-12-30	2017-09-05	http://www	Positive	null	null	null
227	Amazon	Xylophone	B0001850	"MMMW" "G	[14, 35]	Everyone t	5	This gets 5	1272326400	2017-01-03	2017-09-05	http://www	Positive	null	null	null
228	Amazon	Xylophone	B0001850	James Di	[0, 0]	This is a gr	5	Very Satisf	1385100800	2017-01-03	2017-09-05	http://www	Positive	null	null	null
229	Amazon	Xylophone	B0001850	John Doe	[0, 0]	The product	4	Feels chea	1290211200	2017-01-03	2017-09-05	http://www	Positive	null	null	null
230	Amazon	Xylophone	B0001850	Jon F	[0, 0]	I bought a p	5	It Works	1362009600	2017-01-03	2017-09-05	http://www	Positive	null	null	null
231	Amazon	Xylophone	B0001850	L. Rannoch	[0, 0]	This was n	4	Great produ	1360281600	2017-01-03	2017-09-05	http://www	Positive	null	null	null

Test SIGL Qu (100 rows)

Activate Windows
 Update
 Cancel

Recover articles
 Show instances

Figure 16. Output of Xylophone

5. CONCLUSION AND FUTURE WORK

As time passes, product reviews given by different people change. These variations might be due to different reasons like change in user requirements, improvement in product quality, market trend and evolution of technology. This research is focused to make automatic product reputation model to compute dynamic rating. Our Proposed model has different layers such as sentiment layer and semantic layer. Reviews are collected from internet such as

amazon, then features are extracted from those reviews. Sentiment analysis is applied in the base of these features. In second layer, we use semantic knowledge to infer new knowledge for scaling past ratings. We have developed an ontology by using protégé tool. An inference based semantic rules for Dynamic product reputation are defined and query generation has been done using SPARQL query to validate results. We have developed automatic product reputation model to compute dynamic

(changing) rating of product. We performed sentiment analysis manually. In future, work can be done to fully automate the sentiment analysis by coding in java.

REFERENCES

- Nithish, R., Sabarish, S., Kishen, M. N., Abirami, A. M., & Askarunisa, A. (2013, December). An Ontology based Sentiment Analysis for mobile products using tweets. In 2013 Fifth International Conference on Advanced Computing (ICoAC) (pp. 342-347). IEEE.
- Alfrjani, R.: A new approach to ontology-based semantic modelling for opinion mining. In: 2016 im-AMSS 18th International Conference on Computer Modelling and Simulation
- Zehra, S., Wasi, S., Jami, I., Nazir, A., Khan, A., Waheed, N.: Ontology-based sentiment analysis model for recommendation systems. In: Proceedings of the 9th International Joint Conference on Knowledge Discovery, Knowledge Engineering and Knowledge Management (KEOD 2017), pp. 155-160.
- Schouten, K., Frasinicar, F.: Survey on aspect-level sentiment analysis. IEEE Trans. Knowledge Data Eng. 28(3), 813-830 (2016)
- Ali, F., Kwak, D., Khan, P., Riazul Islam, S.M., Kim, K.H., Kwak, K.S.: Fuzzy ontology-based sentiment analysis of transportation and city feature reviews for safe traveling. JO-Transp. Res. Part C: Emerg. Technol. <https://doi.org/10.1016/j.trc.2017.01.014>
- Pang, B., Lee, L.: Opinion mining and sentiment analysis (Foundations and Trends (R) in Information Retrieval) (2008)
- Liu, B.: Sentiment analysis and opinion mining. Synth. Lect. Hum. Lang. Technol. 5(1), 1-167012)
- H.-K. Oh, S.-W. Kim, S. Park, M. Zhou, Can you trust online ratings? a mutual reinforcement model for trustworthy online rating systems, IEEE Transactions on Systems, Man, and Cybernetics: Systems 45 (12) (2015) 1564-1576.
- L. Xiong, L. Liu, Peertrust: Supporting reputation-based trust for peer-to-peer electronic communities, Knowledge and Data Engineering, IEEE Transactions on 16 (7) (2004) 843-857.
- Garcin, F., Faltings, B., Jurca, R., 2009a. Aggregating reputation feedback. In: Proceedings of the First International Conference on Reputation: Theory and Technology-ICORE. Vol. 9. p. 63.
- Hu, M., Liu, B., 2004. Mining and summarizing customer reviews. In: Proceedings of the tenth ACM SIGKDD international conference on Knowledge discovery and data mining. ACM, pp. 168-177.
- Abdel-Hafez, A., Xu, Y., Tjondronegoro, D., 2012. Product reputation model: An opinion mining based approach. In: SDAD 2012 The 1st International Workshop on Sentiment Discovery from Affective Data. p. 16.
- Farooq, U., Nongaillard, A., Ouzrout, Y., & Qadir, M. A. (2016). A multi source product reputation model. Computers in Industry, 83, 55-67.
- Bandari, S., & Bulusu, V. V. (2020). Survey on ontology-based sentiment analysis of customer reviews for products and services. In Data Engineering and Communication Technology (pp. 91-101). Springer, Singapore.
- "SWRL: A Semantic Web Rule Language Combining OWL and RuleML." [Online]. Available: <https://www.w3.org/Submission/SWRL/>. [Accessed: 06-Feb-2020].
- R. M. Tong, An operational system for detecting and tracking opinions in on-line discussion, in: Working Notes of the ACM SIGIR 2001 Workshop on Operational Text Classification, Vol. 1, 2001, p. 6.
- M. Taboada, J. Brooke, M. Tofiloski, K. Voll, M. Stede, Lexicon-based methods for sentiment analysis, Computational linguistics 37 (2) (2011) 267-307.

- S. Dasgupta, V. Ng, Mine the easy, classify the hard: a semi-supervised approach to automatic sentiment classification, in: Proceedings of the Joint Conference of the 47th Annual Meeting of the ACL and the 4th International Joint Conference on Natural Language Processing of the AFNLP: Volume 2-Volume 2, Association for Computational Linguistics, 2009, pp. 701–709.
- B. Pang, L. Lee, S. Vaithyanathan, Thumbs up?: sentiment classification using machine learning techniques, in: Proceedings of the ACL-02 conference on Empirical methods in natural language processing-Volume 10, Association for Computational Linguistics, 2002, pp. 79–86.
- Joshi, N. S., & Itkat, S. A. (2014). A survey on feature level sentiment analysis. *International Journal of Computer Science and Information Technologies*, 5(4), 5422-5425.
- Javeed, M. U., Shafqat Maria Aslam, Hafiza Ayesha Sadiqa, Ali Raza, Muhammad Munawar Iqbal, & Misbah Akram. (2025). Phishing Website URL Detection Using a Hybrid Machine Learning Approach. *Journal of Computing & Biomedical Informatics*. Retrieved from <https://jcbi.org/index.php/Main/article/view/989>
- M.U. Javeed, M. S. Ali, A. Iqbal, M. Azhar, S. M. Aslam and I. Shabbir, "Transforming Heart Disease Detection with BERT: Novel Architectures and Fine-Tuning Techniques," 2024 International Conference on Frontiers of Information Technology (FIT), Islamabad, Pakistan, 2024, pp. 1-6, doi: 10.1109/FIT63703.2024.10838424
- Javeed, M., Aslam, S., Farhan, M., Aslam, M., & Khan, M. (2023). An Enhanced Predictive Model for Heart Disease Diagnoses Using Machine Learning Algorithms. *Technical Journal*, 28(04), 64-73. Retrieved from <https://tj.uettaxila.edu.pk/index.php/technicaljournal/article/view/1828>
- Aslam, S., Usman Javeed, M. ., Maria Aslam, S. ., Iqbal, M. M., Ahmad, H. ., & Tariq, A. . (2025). Personality Prediction of the Users Based on Tweets through Machine Learning Techniques. *Journal of Computing & Biomedical Informatics*, 8(02). Retrieved from <https://www.jcbi.org/index.php/Main/article/view/796>
- Javeed, M. U., Shafqat Maria Aslam, Hafiza Ayesha Sadiqa, Ali Raza, Muhammad Munawar Iqbal, & Misbah Akram. (2025). Phishing Website URL Detection Using a Hybrid Machine Learning Approach. *Journal of Computing & Biomedical Informatics*, 9(01). Retrieved from <https://jcbi.org/index.php/Main/article/view/989>
- Muhammad Usman Javeed, Hafiza Ayesha Sadiqa, Mahrukh Jaffar, Shafqat Maria Aslam, Muhammad Khadim Hussain, Zeeshan Raza, & Muhammad Azhar. (2025). A DEEP LEARNING APPROACH FOR SECURING IOT SYSTEMS WITH CNN-BASED PREDICTION OF WORST-CASE RESPONSE TIME. *Spectrum of Engineering Sciences*, 3(7), 376–385. Retrieved from <https://www.sesjournal.com/index.php/1/article/view/599>
- Shakeel, H. ., Akram, M. ., Javeed, M. U., Azhar, M. ., Aslam, S. M. ., Saifullah, & Mumtaz, M. T. . (2025). LncRNAs Disease: A text mining Approach to Find the role of lncRNA in Aging. *Journal of Computing & Biomedical Informatics*, 9(01). Retrieved from <https://www.jcbi.org/index.php/Main/article/view/1000>
- P. Chiranjeevi, D. T. Santosh, and B. Vishnuvardhan, Survey on sentiment analysis methods for reputation evaluation. In *cognitive informatics and aoft computing*. Singapore: Springer, 2019
- B. Pang, L. Lee, S. Vaithyanathan, Thumbs up?: sentiment classification using machine learning 6. techniques, in: Proceedings of the ACL-02 conference on Empirical methods in natural language processing-Volume 10, Association for Computational Linguistics, 2002, pp. 79–86.
- A. Finn, N. Kushmerick, B. Smyth, Genre classification and domain transfer for information filtering, in: *Advances in information retrieval*, Springer, 2002, pp. 353–362

- K. Dave, S. Lawrence, D. M. Pennock, Mining the peanut gallery: Opinion extraction and semantic classification of product reviews, in: Proceedings of the 12th international conference on World Wide Web, ACM, 2003, pp. 519-528.
- J. Lee, J. C. Oh, A node-centric reputation computation algorithm on online social networks, in: Applications of Social Media and Social Network Analysis, Springer, 2015, pp. 1-22.
- A. Jsang, R. Ismail, The beta reputation system, in: Proceedings of the 15th bled electronic commerce conference, 2002, pp. 41-55
- Ayday, E., Lee, H., Fekri, F.: An Iterative Algorithm For Trust And Reputation Management. Proceedings of the International Symposium on Information Theory, pp. 2051-2055. IEEE. (2009)
- A. A. Selcuk, E. Uzun, M. R. Pariente, A reputation-based trust management system for p2p networks, in: Cluster Computing and the Grid, 2004. CCGrid 2004. IEEE International Symposium on, IEEE, 2004, pp. 251-258.
- Jøssang, A. and Haller, J.: Dirichlet Reputation Systems. Proceedings of the Second International Conference on Availability, Reliability and Security, pp. 112-119. IEEE. (2007).
- Riggs, T., Wilensky, R.: An Algorithm For Automated Rating Of Reviewers. Proceedings of the First ACM/IEEE-CS joint conference on Digital libraries, pp. 381-387. ACM.. (2001)
- Lauw, H. W., Lim, E. P., Wang, K.: Quality and Leniency in Online Collaborative Rating Systems. ACM Transactions on the Web (TWEB), 6(1), 4. (2012).
- Sabater, J., Sierra, C.: Reputation And Social Network Analysis In Multi-Agent Systems. in Proceedings of the first international joint conference on Autonomous agents and multiagent systems. pp. 475-482. (2002).
- Farooq, U., Nongaillard, A., Ouzrout, Y., & Qadir, M. A. (2016). A multi source product reputation model. Computers in Industry, 83, 55-67.
- Kontopoulos, E., Berberidis, C., Dergiades, T., & Bassiliades, N. (2013). Ontology-based sentiment analysis of twitter posts. Expert systems with applications, 40(10), 4065-4074.
- Bandari, S., & Bulusu, V. V. (2020). Survey on ontology-based sentiment analysis of customer reviews for products and services. In Data Engineering and Communication Technology (pp. 91-101). Springer, Singapore.
- Ali, F., Kwak, D., Khan, P., Islam, S. R., Kim, K. H., & Kwak, K. S. (2017). Fuzzy ontology-based sentiment analysis of transportation and city feature reviews for safe traveling. Transportation Research Part C: Emerging Technologies, 77, 33-48.
- Nithish, R., Sabarish, S., Kishen, M. N., Abirami, A. M., & Askarunisa, A. (2013, December). An Ontology based Sentiment Analysis for mobile products using tweets. In 2013 Fifth International Conference on Advanced Computing (ICoAC) (pp. 342-347). IEEE.
- Sam, K. M., & Chatwin, C. (2015). Ontology-based sentiment analysis model of customer reviews for electronic products. In Encyclopedia of Information Science and Technology, Third Edition (pp. 892-904). IGI Global.
- Kumar, A., & Joshi, A. (2017). Ontology driven sentiment analysis on social web for government intelligence. In Proceedings of the Special Collection on eGovernment Innovations in India (pp. 134-139)
- Zehra, S., Wasi, S., Jami, S. I., Nazir, A., Khan, A., & Waheed, N. (2017, November). Ontology-based Sentiment Analysis Model for Recommendation Systems. In KEOD (pp. 155-160).
- Ali, M. M., Doumbouya, M. B., Louge, T., Rai, R., & Karray, M. H. (2020). Ontology-based approach to extract product's design features from online customers' reviews. Computers in Industry, 116, 103175.
- Yergesh, B., Bekmanova, G., Sharipbay, A., & Yergesh, M. (2017, July). Ontology-based sentiment analysis of kazakh sentences. In International Conference on Computational Science and Its Applications (pp. 669-677). Springer, Cham.

- Marstawi, A., Sharef, N. M., Aris, T. N. M., & Mustapha, A. (2017, January). Ontology-based aspect extraction for an improved sentiment analysis in summarization of product reviews. In Proceedings of the 8th International Conference on Computer Modeling and Simulation (pp. 100-104).
- Nagano, S., Inaba, M., Mizoguchi, Y., Iida, T., & Kawamura, T. (2008, August). Ontology-based topic extraction service from weblogs. In 2008 IEEE International Conference on Semantic Computing (pp. 468-475). IEEE.
- Abdel-Hafez, A., & Xu, Y. (2013, November). Ontology-based product's reputation model. In 2013 IEEE/WIC/ACM International Joint Conferences on Web Intelligence (WI) and Intelligent Agent Technologies (IAT) (Vol. 3, pp. 37-40). IEEE.
- Abaalkhail, R., Alzamzami, F., Aloufi, S., Alharthi, R., & El Saddik, A. (2018, August). Affectional ontology and multimedia dataset for sentiment analysis. In International Conference on Smart Multimedia (pp. 15-28). Springer, Cham.
- Singh, W. (2017, March). Sentiment analysis of online mobile reviews. In 2017 International Conference on Inventive Communication and Computational Technologies (ICICCT) (pp. 20-25). IEEE.
- Polsawat, T., Arch-int, N., Arch-int, S., & Pattanachak, A. (2018, June). Sentiment Analysis Process for Product's Customer Reviews Using Ontology-Based Approach. In 2018 International Conference on System Science and Engineering (ICSSE) (pp. 1-6). IEEE.
- CHANNA, N., KEERIO, A., & PATHAN, K. (2014). SEMANTIC AND ONTOLOGY BASED METHODS FOR CONSTRUCTING PRODUCT KNOWLEDGE IN OWL. S. Sindh University Research Journal-SURJ (Science Series), 46(4).
- Ali, F., Kwak, D., Khan, P., El-Sappagh, S., Ali, A., Ullah, S., ... & Kwak, K. S. (2019). Transportation sentiment analysis using word embedding and ontology-based topic modeling. Knowledge-Based Systems, 174, 27-42.
- Hou, Y., Li, J., He, Z., Yan, A., Chen, X., & McAuley, J. (2024, March 6). Bridging Language and Items for Retrieval and Recommendation (introducing AmazonReviews2023 dataset). arXiv. Available at GitHub.