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Uncovering the Challenges in Opinion Mining and Sentiment Analysis

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Abstract
The expansion of the Internet has significantly transformed the way people communicate and share their opinions. Individuals now express their views more openly—whether reviewing a product they have purchased, discussing a film they have watched, or commenting on current social or political issues. In this environment, opinions have become a critical element in shaping attitudes and guiding both individual and organizational decisions. The widespread use of online platforms such as social media networks, personal blogs, microblogging sites, and digital marketplaces has amplified this trend. Users continuously contribute their perspectives and react to those of others, producing an immense and constantly evolving body of opinion-driven data. As a result, identifying and interpreting useful information from this large volume of unstructured content has become an important and challenging task. This paper explores the fields of opinion mining and sentiment analysis in detail. It examines the main difficulties encountered in these domains and specifies the best-suited technique available to resolve issues; it also provides relevant examples to illustrate their application.

Keywords: Sentiment Analysis, Opinion mining, Polarity, Challenges

1. Introduction

The emergence of the internet has revolutionized how individuals share ideas and opinions across the globe. One can express oneself as an individual without any bias. In today's digital environment, personal opinions significantly shape public perception and decision-making. Communities often rely on collective viewpoints to identify better products, make informed purchases, and strengthen overall judgment. A wide range of platforms are available on the web, like Social Networking sites (Facebook, Twitter), E-Commerce sites (Amazon, Flipkart, Snapdeal, etc.), Trip planner sites (Makemytrip, Tripadvisor, Trivago, etc.), and Consumer Review Sites (Mouthshut), where users can freely post their opinions.

People tend to see reviews before purchasing anything online or offline. They also tend to compare similar product features before buying them. They even see movie reviews before going to watch it. Before going on a vacation, they do research about various places they wish to visit, read reviews about hotels. On the other hand, vendors wish to know the interests of consumers. So, they can improve their products, reduce costs, reduce time, develop new products, optimise offers, and make smart decisions. Competitors would like to see the opinion so that they can improve their marketing strategy.

The web now contains an enormous volume of user-generated content, making it increasingly difficult to extract meaningful insights efficiently. Opinion mining, a branch of text analysis, addresses this challenge by identifying and categorizing the emotional tone expressed in textual data. It integrates natural language processing and classification techniques to determine whether a statement conveys a positive, negative, or neutral sentiment.

This paper includes: a) an Overview of opinion mining and sentiment analysis, and b) a comprehensive survey of issues and challenges in the field of opinion mining.

2. Opinion Mining and Sentiment Analysis

Definition: If a set of text documents (T) are given, that have opinions on an object, opinion mining intends to identify various aspects of the object on which opinion have been given, in each of the document $t \epsilon T$ and to find polarity of the comments i.e. whether the comments are positive, negative or neutral[1].

Opinion mining is the field to extract the opinionated text from different sources and summarized it in the understandable form for the end user. There is a very thin line between sentiment and opinion mining. In Merriam-Webster's dictionary[2], the term *sentiment* can be described as an emotional reaction or feeling that shapes one's attitude or judgment, while *opinion* refers to a personal belief or viewpoint formed after evaluation or reasoning. In essence, an opinion represents what a person thinks about a subject, whereas a sentiment reflects how that person feels about it. For example, the sentence "I am concerned about the current state of the Share Market" expresses a sentiment, whereas the

sentence "I think the Share Market is not doing well" expresses an opinion. However, the underlying meanings of the two sentences are interrelated because the sentiment depicted in the first sentence is likely to be a feeling caused by the opinion in the second sentence. We can also say that the first sentence implies a negative opinion about the Share Market, which is what the second sentence is saying. Although the two concepts frequently intersect, they are not identical. In most cases, opinions tend to carry an underlying sentiment—positive, negative, or neutral. The analytical tasks associated with these concepts differ slightly: **opinion mining** focuses on identifying and interpreting what individuals think about an entity or issue, whereas **sentiment analysis** aims to detect and evaluate the emotional tone or polarity expressed in textual data.

2.1 Objective vs. Subjective Sensors

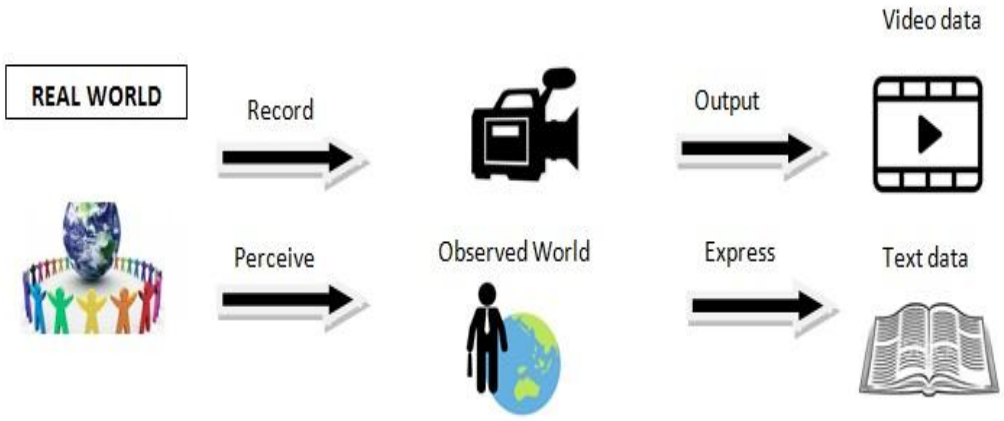

Figure 1: Objective vs. Subjective Sensors

Text data can be recorded as data generated from humans as subjective senses. In contrast, we have other devices, such as a video recorder that can record what is happening in the real world objectively to generate view data. Now the main difference between text data and other data (like video data) is that it has rich opinions, and the content tends to be subjective because it's generated by humans. We can mine text data to understand the opinions, understand people's preferences, and how people think about something. We need to analyse and mine a large number of opinions buried in text.
An opinion is a **subjective** statement describing what a **person believes** or **thinks** about **something**.

In contrast to Subjective statements, Objective statements, or Factual statements are those statements that can be proved right/wrong. In a **subjective** statement, this is a key differentiating factor from opinion, which tends not to be easy to prove wrong or right because it reflects what the person thinks about something.

Example 1: This laptop has a screen and a battery.
Example 2: This laptop has the best battery.

The statement in example 1 checks if the laptop has a screen & battery or not. Whereas the statement in example 2 is subjective, and it is difficult to prove whether the statement is right or wrong. Hence, we can say that an opinion is a subjective statement.

An important factor is the **person** who is an opinion holder, because when we talk about opinions, it's about the opinions held by a person about something. And **something** means the target of the opinion is expressed on this **something. Beliefs or thoughts** imply that the opinion would depend on culture or background and context in general, because a person might think differently in different contexts. People from different backgrounds may also think differently.

2.2 Opinion representation

Opinion Mining or Sentiment Analysis extracts opinionated text datasets, summarizing them in an understandable form for end users. It extracts "positive", "negative", or "neutral opinions" from unstructured data. So, for the classification of opinion, it is very important to understand Basic and Enriched opinion representation.

2.2.1 Basic opinion representation

Opinion holder: Whose opinion is this?
Opinion target: What is this opinion about?
Opinion content: What exactly is the opinion?

An opinion holder is the holder of a particular opinion; it may be a person or a person representing an organization that holds the opinion. In the case of an E-commerce site reviewer is the person who writes their reviews. **Opinion target** is an entity about which the user expressed their views or sentiment based on their knowledge or experience. An entity can be a person, topic, product, organization, thing, place, etc. **Opinion content** is a piece of text that represents the sentiment or view of an opinion holder about an object.

2.2.2 Enriched opinion representation

Opinion context: Under what situation (e.g., time, location) was the opinion expressed?
Opinion sentiment: What does the opinion tell us about the opinion holder's feeling (e.g., positive, negative)?

Example: The Samsung Galaxy S24 Ultra has an impressive camera.

In this example, the target is Samsung Galaxy S24 Ultra, the content is "has an impressive camera", and the opinion holder is the person expressing the review. This represents a basic structure of an opinion. If we extend this to include context and sentiment, the contextual information might be something like "The review was posted on 5th March 2024", and the sentiment polarity is positive. Such enriched opinion representation—combining target, holder, content, sentiment, and context—enhances the depth of opinion mining. However, identifying these components becomes much more challenging in complex statements, where the target or sentiment may be implied rather than explicitly mentioned. Therefore, in practical applications, Natural Language Processing (NLP) techniques are required to automatically extract these elements from user-generated text such as product reviews, tweets, or feedback comments.

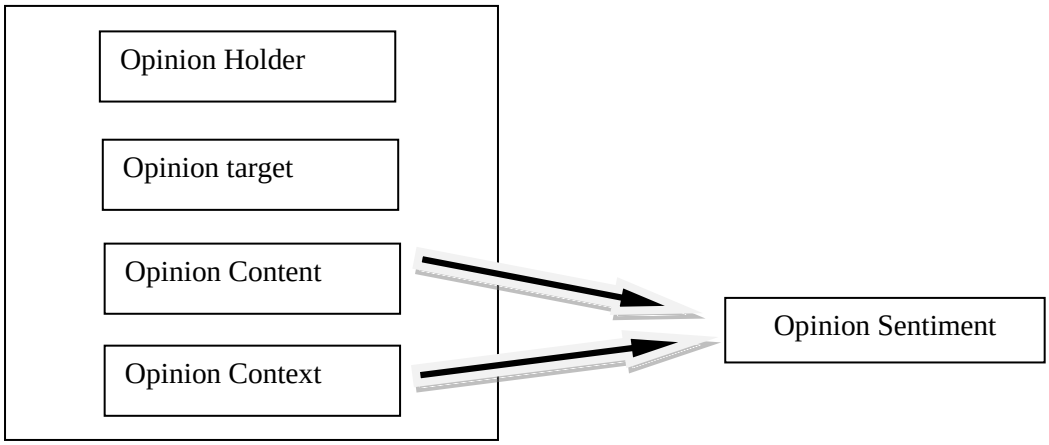

Figure 2: The task of opinion Mining

3. Challenges and issues (A Comprehensive survey)

The field of opinion mining has witnessed rapid advancement in recent years, bringing with it a range of emerging difficulties and open research questions. Among the prominent challenges are identifying the polarity of opinions, verifying their authenticity, filtering irrelevant or noisy data, handling text compression, detecting spam or fabricated reviews, and isolating the true opinion-bearing components within a document. The subsequent sections provide a detailed review of these issues and discuss the major obstacles that continue to shape ongoing research in this domain.

3.1 Polarity Judgement: The polarity of an opinion word can vary depending on the context in which it is used. A term that conveys a positive sentiment in one scenario may express a negative sentiment in another. Within the domain of Opinion Mining and Sentiment Analysis, determining the correct polarity

of such words across different contexts remains a significant challenge for researchers. They have used the Aspect-Based Sentiment Analysis and Summarization (ASAS) system for context-dependent polarity judgement. Polarity measured in PMI (Point-wise mutual information) with an average accuracy of 78% [1,4,19].

Example:
Sentence 1: The laptop is *light*, making it convenient to carry while traveling.
Sentence 2: The laptop feels *light* and cheaply built.

In this example, the word **"light"** is generally considered positive in Sentence 1 because it highlights portability and ease of use. However, in Sentence 2, the same word conveys a negative sentiment, implying poor build quality. This demonstrates how contextual factors influence the polarity of opinion words in sentiment analysis.

3.2 Usage of Negation: In opinion mining research, classifiers often struggle to accurately interpret negation within textual data. Distinguishing between expressions such as *"nice"* and *"not nice"* poses a significant challenge, as the presence of negation completely alters the intended meaning. Therefore, effectively identifying and handling negation is essential for improving the accuracy of sentiment classification. Traditional lexicon-based approaches for opinion mining are usually not able to handle negation well. Negation handling algorithm on dependency-based parse tree handles negation well with an Accuracy of 62.57% [5,20].

Example: The laptop is not durable.
In this example, the word *"durable"* usually conveys a positive quality of the laptop; however, when preceded by *"not"*, as in *"not durable"*, it expresses a negative opinion about the product.

3.3 Complexity of sentence or document: Sometimes, on social media and microblogging, reviews are too long, with complex sentence framing, and are difficult to understand. So, it is challenging to derive judgment from a complex sentence or document that may contain multiple views [6].

Example:
(1) Yesterday, Sita bought a wrist watch from a store, and Geeta bought a wrist watch online.
(2) We compared both the watches.
(3) Sita paid a higher price than Geeta.
(4) But the quality of Sita's watch is better than Geeta's watch.
(5) Geeta is not satisfied with the quality.
(6) So, Geeta will return it tomorrow.

In the above example, sentences (1), (2), and (6) don't give any opinion. Sentence (3) gives a negative opinion about the price of Sita's watch but a positive opinion about the price of Geeta's watch. Sentence (4) gives an opinion about the quality of the watch. Sentence (5) is negative about Geeta's watch rather than 'Geeta'. So, in a complex review, it is difficult to identify the object with its sentiments.

3.4 Usage of Interrogative sentence: An **Interrogative sentence** is a **sentence** whose grammatical form shows that it is a question. Such **sentences** may exhibit an **interrogative** grammatical mood. This applies particularly to languages that use different inflected verb forms to make questions, and it uses an opinion object with positive or negative polarity. So, such a type of sentence doesn't give any opinion, and identification of such a sentiment is indeed a challenge. The authors used a Deep Neural Network sequence model, which is a BiLSTF(bidirectional long short-term memory with conditional random fields), to extract target expressions in opinionated sentences with 72.44% accuracy [7,21].

Example: Is it worth paying Rs. 1,00,000 for a phone with a good MP camera?
In the above example, there is actually no opinion, but the usage of 'good' with 'camera' turns into a positive sentence.

3.5 Usage of Conditional Sentence: A conditional sentence creates the same confusion as an Interrogative sentence does. Actually, it doesn't give any opinion, but still, it uses opinion words with their polarity. The authors used an SVM model to automatically predict whether opinions on topics are

positive, negative, or neutral. The Best Accuracy of the whole sentence-based classifier with a window size of 8 was 67.3% [7,22].

Example: Before the launch of X refrigerator, Mr. Y wrote a review, I will buy this refrigerator only if it makes ice in 10 minutes.
In the above example, it is clearly a condition for buying a refrigerator, and no positive opinion is identified.

3.6 Handling clamorous text: Many times, it happens that the opinion contains clamorous text. Clamorous text may be because of spelling mistakes, grammatical mistakes, missing or problematic punctuation. So, finding out the polarity of such a sentence is a major issue in sentiment analysis [4].
Example:
What a hilarious movie it was!
What a hilarious movie it was.
In the above example, spelling mistakes and the usage of exclamation(!) with 'What' are problematic in finding out the correct polarity of the sentence.

3.7 Handling Informal Language: In the present digital landscape, reviews and comments frequently contain informal or non-standard language. Extracting meaningful opinions from such casual expressions poses a significant challenge for opinion mining systems. Using the process of Text Normalization with tokenization, stop word removal, part of speech tagging, stemming, and Lemmatization gives the best result for informal language with an accuracy of 82.357% [8,23].

Example:

Yep	Yes
Whats up?	What is going on?
Ttyl	Talk to you later
Life is kinda good	Life is kind of good
Cya	See you

3.8 Assemble synonym: In the task of opinion mining, it may be possible that the same opinion object is used with different synonyms, and assembling all the synonyms is difficult. A flexible matching method is used by extracting synonymous expressions from an ordinary dictionary and a Web corpus and introducing the SYNGRAPH data structure. Information retrieval (IR) gives the best result with 51% R-prec. [1,9,24].

Example:
The atmosphere of this restaurant is very nice.
The surroundings of this restaurant are good.
In the above example, Atmosphere and Surrounding both show positivity about the same object.

3.9 Usage of different languages: It's obvious to have opinions in languages other than English (like Hindi, Gujarati, Urdu, Arabic, French, etc). That opinion may be for a product, movie, restaurant, or any political party. To analyse the usage of different languages is an issue. Available resources in English can be mapped to other languages for cross-lingual opinion mining. The authors employed a 10-fold cross-validation technique with classifiers (Multinomial Naive Bayes, Linear Regression, and SVC Linear) on Brazilian and European tweets, achieving accuracies of 65.33%, 67.46%, and 67.46%, respectively [9,25].

Example: c'est un très beau téléphone
In the above example, the review about a phone is positive, but in French. Therefore, analyzing opinions in different languages is a challenging task.

3.10 Sarcastic sentence: Sarcasm or irony often appears as a statement that seems complimentary but actually conveys the opposite sentiment. Such expressions typically include opinion words with a positive tone, yet their true implication is negative. Hence, detecting sarcasm remains a significant challenge in

opinion mining. The authors used a Supervised machine learning technique, SVM (Support Vector Machine), which gave the best result with an accuracy of 66% [3,9,26].

Example: Great! The software crashed again right before my presentation.
In this example, the sentence appears to express appreciation, but in reality, it conveys frustration. Detecting such sarcasm in text is a difficult task for opinion mining systems.

3.11 Handling of opinion without adverb/adjective: Opinion doesn't always need to contain an adverb or an adjective like worst, bad, poor, etc. Sometimes there are sentences which doesn't use an adverb/adjective. So, in sentiment analysis, it is difficult to measure its polarity. The authors used a Pattern extraction approach with a Recall of 85%, a Precision of 73% and an F-measure of 79% [7,27].

Example: My phone has kind of features that the part of my life.
In the above example, an adverb or adjective is not used, but it gives a positive opinion about the phone.

3.12 Understanding of the point varies vary individual to individual: Person to person acceptance of opinion may vary. For a person opinion may be positive, but for some other person it may be negative. Lexicon-based approach gives the best result with a combination of JRCTonality and MicroWordNet with 82% Accuracy [7,28].

Example: Dollar price is increasing with respect to the Indian rupee.
This document has both positive and negative meanings, and its value varies from person to person. This sentence has a positive sentiment for the Exporter, while this same sentence has a negative sentiment for the importers.

3.13 Fake review analysis: With the rapid expansion of internet usage, a vast number of opinions are now easily accessible online. However, many of these reviews may be deceptive or spam-generated, making the identification and filtering of such false content a complex and demanding task. Mostly machine learning approach is used, and SVM gives the best result with 81.35% accuracy [7,11,29].

3.14 Use of Emoticons: In modern digital communication, nonverbal cues play a significant role in conveying opinions. The widespread use of emoticons in reviews adds complexity, making it challenging to accurately extract and interpret the underlying sentiment. Supervised learning approach gives the best result with emoticon weight lexicon method with naive base classifier and gives accuracy more than 80% [12,30].

3.15 Handling unstructured review: A Wide range of opinions is available on the web. whether it is a product review, or movie review, or a review on a social networking site. Converting an unstructured review into a structured one is a challenging task. Unstructured review may be a combination of text, videos, photos, audio files, presentations, webpages, etc. Mining of such unstructured data is a challenging task in opinion mining. Using the process of text normalization with tokenization, stop word removal, part of speech tagging, stemming, and Lemmatization gives the best result with an accuracy of 82.357% [10,13,31].

3.16 Unavailability of old review: By the time new reviews are added, old reviews may not be available to the user. Because of the unavailability of all the data, mining will not be that accurate[5,17].

3.17 Filter Bubble: It is an intellectual isolation that can occur when websites make use of algorithms to selectively assume the information that the user wants to see. It is only the present information that will abide by the user's past activity, and the user is unaware of the contradicting viewpoint [14].

3.18 Sentiments change over time: With the passage of time, certain product gets improved, or people change their opinion about the product. So, it is a challenging task to mine opinions that are going to change with time[1,15].

3.19Authorization of opinion: Acceptance of opinion is very important. The source of information should be analysed, and the opinion holder should be able to analyse the authority [18].

3.20 Domain dependent: When sentiment analysis gives a result dependent on some particular feature, then that particular element is positive for one domain but may be negative for another domain. So, finding out the correct opinion is a very crucial task when it is domain-dependent. Semi-supervised approach is used, which combines modified maximum entropy and bipartite graph clustering. Comparison of SentiWordNet of domain-specific and domain-independent words reveals that, on average, 72.6% and 88.4% words, respectively, are correctly classified [16,32].

3.21 Use of Ideographic words: People tend to use ideographic words to give more strength to their opinion. Ideography is a method of representing the sound of a language by writing. Usually, Naive Bayes, SVM, and Decision Tree for the classification of sentiment analysis are used, and the SVM model has outperformed the other classifiers.

Example: This painting is sooooooooo beautiful, or the Food of this restaurant is veryyyyyy unhygienic.
In the above example, we can identify that these types of opinions give more strength to the overall opinion, but identification of this type of language is a challenging task [3,8,33].

We have identified the following issues, which are not focused on much in the literature available.

3.22 Use of Homonyms: Use of Homonyms in opinion may create difficulty in two ways. Firstly, we have English words where the pronunciation of the word is the same, but the meaning is different. So sometimes people change their use of words in a sentence, and the overall judgement of the sentence may vary.

Example: Goa is a beautiful place with a wide number of sea/see.
Secondly, we may have used the same word, but the meaning of that word may be different in both sentences.

Example: She put a beautiful bow in her daughter's hair. / Please bow down to the great emperor.
It is again a challenging task to summarize the opinion.

3.23 Use of Modal Verb: In opinion mining use of the modal verb may change the strength of an opinion to some extent.

Example: This beautiful T-shirt may fit her.
Here in the above example, 'may' is a modal verb, and it shows the uncertainty of the T-shirt size, which is a negative thing. So, this issue remains challenging in the area of opinion mining.

3.24 Identifying hidden opinion: It is not always necessary that the commenter will give a comment or opinion directly. There may be situations where an opinion doesn't have direct indication, though it stands with a strong opinion. So, to gain such hidden opinions is a challenging task. This may happen with hidden features in product reviews, hidden aspects in movie reviews, or hidden services in restaurant reviews.

Example: Yesterday I went to a restaurant. The food was very delicious, but I don't think everyone can afford it.
In the above example, there is a **Direct** positive comment on 'food' but an **Indirect** negative comment about its 'price'.

3.25 Differently expressed same opinion: Thousands of people give feedback on any social networking site, blogs, or on a movie review website. Then it may be possible that many of the written reviews end with the same opinion, but the way of expression is different from individual to individual. So, to summarize the same opinion in one bucket is a challenging task.

Example:
Sentence 1: I enjoy my phone with the best screen resolution and high-definition camera(both front and rear).

Sentence 2: I just love my phone as it captures the best photographs.

In the above examples same opinions are differently expressed.

3.26 Interpretation of analysis: While doing opinion mining, a miner may focus on some of the important contents and features and present the result accordingly. So, eventually, the user would be unaware of some content that was not considered in the analysis.

3.27 Persistence of topic: This issue would happen especially with social networking sites, where the topic is deviated from by irrelevant comments. So, this may lead to a large no. of users giving comments on the targeted topic. Gradually, the discussion would get deviated from what it was initially started and thus it would be difficult to mine the opinion/topic.

3.28 Product comparison based on common aspects: In the research of opinion mining, product comparison will be done on common aspects of a product to some extent, but the aspects that are not common would need more research.

3.29 Sentiment analysis of social media review: With the wide usage of social media, people give opinions on different objects like current affairs, political parties, newly released movies, or any product. So, summarization of all the objects by analysing all the reviews will be a challenging task.

4. Conclusion

Opinion mining is an emerging field to extract the knowledge from a huge volume of data that may be consumers' comments, feedback, or reviews on any product, topic, or opinion on someone's opinion, etc. These uses varied technologies to mine people's opinions and sentiments. But with the wide usage of applications, it is also facing many research challenges. In this paper, Section 1 gives you the Introduction to Opinion Mining. Section 2 gives an understanding of opinion mining and sentiment analysis, and representation of opinion. Section 3 gives a thorough understanding of issues and challenges faced in Opinion mining and Sentiment Analysis. We have tried to present these issues with real-world examples. This comprehensive survey paper will be really useful for researchers and beginners in the field of Sentiment Analysis and Opinion Mining.

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