Review Article

Implementing E-Commerce Platform for Quality Evaluation using Product Reviews

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Abstract *– Electronic trade (e-commerce) is a paradigm that can influence both marketers and consumers. On other hand, E-commerce is considered to be an alternative to boost up the current marketing strategy. It guides the entire transformation of the conventional business model. This massive change in business model is exploding the globe, including India.*

Now days the E-commerce performs a vital role past 1.5 years due to COVID -19 pandemic as well as continue its growing journey for nextup coming years as well. For shopping or buying the stuff online Product Review on the product quantity service and the plays an important role. The product review elaborate the product quality, Service or delivery time and many more detail information about the product. To understand the person's intent about the products sentiment analysis is always targeted as to Positive or negative respectively.

In this paper an attempt is made to introduce the E-Commerce Platform for Quality Evaluation Using Product Reviews. Here the survey by different researcher is elaborated to get an overall idea about different techniques that contribute the improvement of the E- commerce frame work now days. A full vision of the proposed work that we introduce that aids in determining whether facets of the product are positive, negative, or neutral using the aspect raking technique.

Keywords - *E-Commerce Platform, Analysis of product Review, Aspects Ranking, Overall Product Ranking, positive or negative intent.*

I. INTRODUCTION

A. Ecommerce

In the times of today, the world is flocking with Ecommerce stores all around us.It is true that businesses grows by the result of knowing and meeting the demands as well as the requirements of consumers. Nearly all business platforms are practically, in a way, an Ecommerce platform. Amazon, Alibaba, flipkart, Myntra and many more are the current giants in E-Commerce [2]Online shopping has been a rising trend across the world for the last decade not only in fashion and electronics, but also in areas such as grocery delivery. In recent years, ecommerce has expanded to new heights as a result of the infrastructure of easy Internet connectivity from everywhere, as well as crucial insight and familiarity with the operation.

There are a plenty number of factors that go into determining an Ecommerce platform's popularity and reputation. Product Reviews, extremely is considered to be a vital element in improving an Ecommerce's credibility, standard, and assessment.

B. Importance of product reviews in ecommerce

Many shoppers depend on online product feedback in an ecommerce-driven environment where they can't physically inspect goods before buying. One of the most valuable methods available to an Ecommerce shop is product reviews:

Customer Response (feedback).Product Reviews and feedbacks have changed the game for online market since they are considered as best factor in keeping their winning streak going. User ratings are the factors that determine whether a consumer has a positive or negative experience with a retailer; they help to build loyalty and confidence, as well as remind potential consumers about the product and the attributes that distinguish it from other products.In today's web-based world, virtually everyone is reading product reviews. In fact, on an average 91% of buyers read product reviews before shopping, judging a product and 84% trust these review as much as they would a personal recommendation. Product ratings have observable consequences as well.

C. Key features that product review

- Product Reviews help us with the Ecommerce platform's identity, marketing, and advertisement, as well as the product itself.
- **Customer Interaction:** User reviews are a great way to interact with users directly, hear about their products from their viewpoint, and make changes where appropriate.

- **Product Purchase Information:** Online reviews are beneficial to companies because they improve revenue by providing customers with the knowledge they need to make an informed purchase.

D. Advantages of Product Reviews in Ecommerce

The most significant benefit that Product Reviews bring with an Ecommerce shop is an improvement in sales or the amount of orders made by customers.

a) Sentimental analysis

The term 'sentiment analysis' is also known as Natural Language Processing (NLP)approach or Opinion mining [4] as well. Sentiment analysis helps in the analysis of textual data and the detection of emotional tone, allowing for a better understanding of consumer feelings, perceptions, and opinions on a given subject. Opinion mining can be categorized into three groups: Sentiment analysis at the text, sentence, and aspect levels (also called as feature level) [4] [5] [6].

b) Aspect-based sentiment analysis

This technique categorizes the data by aspect and identifies the sentiment attributed to each one.It may be used to measure consumer reviews by associating various facets of a product or service with particular emotions.

The first two approaches, such as text- and sentence-level analysis, are unable to include specific details, such as the aspects about which users comment. Sentiment analysis at the function level aids in the analysis of sentence polarity (positive, neutral, negative) and strength (weak, mild, heavy, extreme).

It is also capable of distinguishing the viewpoint's (opinion) feature. The goals, functions, and features of the different online product review and recommendation sites available vary. The on-function features of these platforms have been extensively researched.

This paper provides a review on analyzing the customer opinionfor online platforms and the impact of those on consumer buying behavior.

II. LITERATURE REVIEW

Anna Gatzioura and her colleagues [4] suggested aRecommender systems (RSs) have been used to help users deal with information complexity and identify suitable things to suit their needs in a variety of domains, as well as vendors recognize customer needs and expand the number and variety of items they deliver. Recommender structures have recently been an integral feature of a variety of applications. A innovative case-based advice methodology attempts to address these issues while also presenting more information about consumer needs and object collection habits.
Advantage:

- This system allows for a deeper interpretation of consumer needs in object collection patterns.

- One of the system's key benefits is the ability to suggest complimentary products to the ones you've already chosen.

Data mining for consumer segmentation and market basket review is proposed by RokhmatulInsani et al. [5]. The author proves that K-Means Clustering is more suited for segmentation by contrasting it to the Kohonen SOM Algorithm. Profitable consumer product packages are used to determine the relationship between product packages.
Advantage:
The framework is beneficial for businesses who want to have exclusive offers to their customers.

To make parallel Frequent Item Set Mining on Hadoop clusters more efficient.YalingXun et al. [6] suggested FiDoop-DP, a data partitioning solution based on the Map Reduce programming model. FiDoop-DP operates on a 24-node Hadoop cluster and is driven by a complex range of datasets generated by IBM Quest Market-Basket Synthetic Data Generator.
Advantage:

- Through removing unnecessary transfers on Hadoop nodes, it helps to reduce network and processing loads.

- Improves the performance of parallel frequent-pattern schemes improved by up to 31%, with an average increase of 18%.

By mixing terms segmentation technologies and association rules on the products, XIE Wen-xiu et al.[7] have a creative consumer basket analysis tool. Using word segmentation technology, item characteristics can be produced automatically prior to mining association rules.
Advantage:
By mining association guidelines for products people bought together, include scientific judgments support for the retail industry.

Wan Faezah Abbas et al.[8] gives the identification of the purchasing pattern of sport items with the assistance of Market Basket Analysis. The historical data is an analysis to distinguish related products from consumer purchase data, which includes mainly, includes the details about sales, object, as well as order data.
Advantages:
The suggested scheme will assist the Sport Company in determining spending patterns and identifying repetitive patterns for the use of increase revenue.

The author of GolchiaJenabi et al. [9] reports on the current state of the Iranian automotive maintenance industry as well as uses segments consumers using various data collection and data mining approaches.Its aim is to define the kind of consumer you're looking for who is most similar to purchase the optional services. Although the dataset

determined in this analysis phase is actual company data, several preprocessing measures were used, and the dataset information were separated into two categories by assigning labels to the documents. Probably as soon as we complete of the initial step of preprocess, CAID as well as C5.0 approach of decision tree have been applied to differentiate the customers as well as guide the entire organization to make decision. A company can include several additional features before making the decision, according to the outcomes of two decision tree processes.

Wei Zhao et al. [8] introduced a novel framework based on the deep learning for product review sentiment analysis. This framework classifies the mood of the frequently circulated product ratings accessible as poor supervision signals.

The process is divided into two parts:

(1) For supervised fine-tuning, apply a classification layer on top of the embedding layer and use named sentences.

Advantages

The deep learning approach is applied to overcome the complex task that mainly includes the concept of the feature engineering.

Disadvantages

Following are 2 key requirement of the deep learning algorithm

- The large scale of training data or information is the key requirement of then deep learning algorithm.
- The 2nd need is to, label the large amount of the data/sentences is considered to be a laborious task.

III. OVERVIEW OF PROPOSED SYSTEM

This section describes structural design of the implemented system with detailed working of the system. The systems help the customer in making intelligent decisions about product purchasing by giving overall ranking. The system gathers information in the form of feedback from various websites. The system provides user interface to and display the reviews.

Goal: -The system's initially assist the customers in making informed product buying decisions by evaluating +ve,-ve, and neutral consumer feedback/reviews.

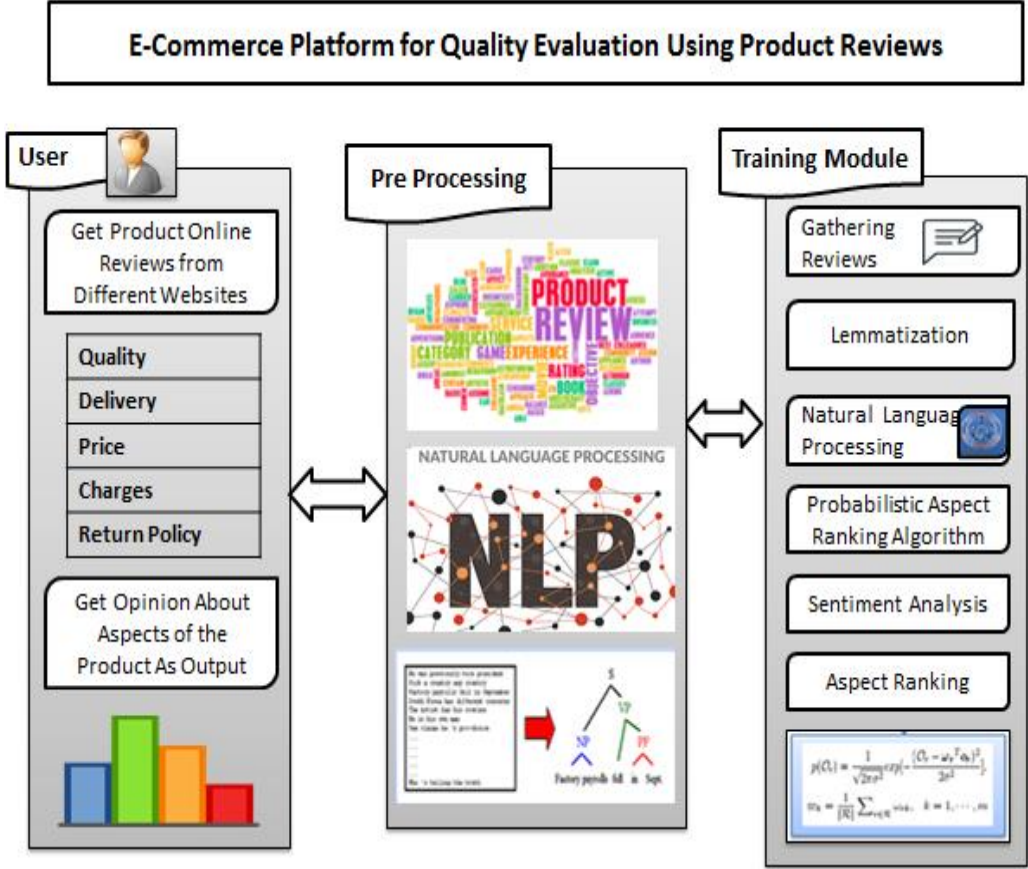Following figure represents the overview of the framework we'll be implementing.

Fig. 1 System Architecture

Following steps represents the proposed work.

Step 1: - Aspect Ranking Framework

This framework holds the different fundamental models like aspect identification, aspect classification, sentiment classification and aspect ranking respectively.

Step 2: - Preprocessing

Using NLP, the machine can understand each and every phrase any of the product review. NLP is essentially used to remove functionality for interpreting sentences and word.

- Tokenization: It splits sentences into words
- Normalization: Removes stop words from input text data
- POS Tagging: The term (POS) Refers to (part of Speech). POS detects if the word token is noun, verb, as well as it belongs to adjective.

Step 3: - Aspect based Feature Extraction

After the preprocessing step the key features like product quality, delivery, price, charges and return policy are extracted from the product review. The features are extracted from the product review by using following approaches;

- WordNet dictionary→ finding word and their sense
- Finding negative annotations
- Dictionary approach→ Calculating overall weightage

Step 4: -Display Overall Ranking

To display the overall ranking of the product so it can assist the customer for making intelligent decisions about product purchasing.

Consumer attitudes and actions toward a buying choice were greatly influenced by online consumer feedback of goods or services. While no NLP scheme is flawless, this one increases the quality in the terms of the accuracy as well as utility of its review summary by optimizing product awareness and aspect too.
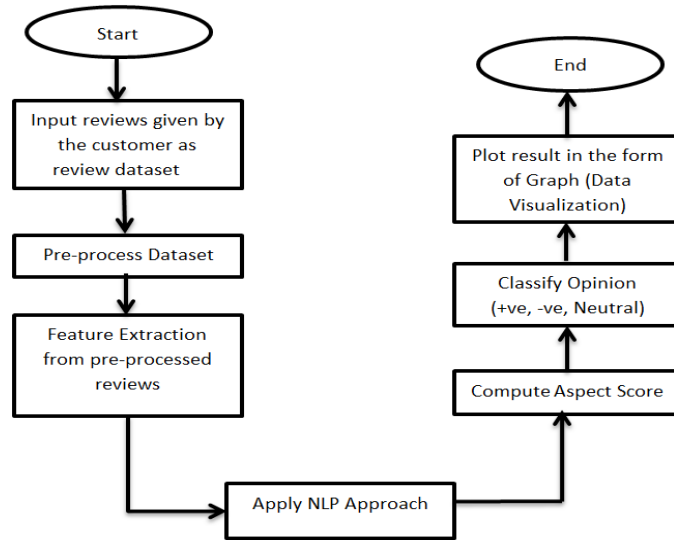
Fig. 2 Flowchart of the proposed system approach

IV. ALGORITHMS USED

The specifics of the proposed Product Factor Rating system are provided in this section. We'll start with a high-level analysis of its pipeline, which is made up of three major components:

(a) Aspect identification.
(b) Sentiment classification on aspects.
(c) Probabilistic aspect ranking.

Algorithm pseudo code of the Probabilistic Aspect Ranking Algorithm

Start

Input: Consumer review corpus R, each review r $\in R$ is associated with an overall rating O_r, and a vector of opinions o_r on specific aspects.

Output: Importance scores $\varpi_\kappa|m_{\kappa=1}$ for all the m aspects.

while$not\ converged$ do

  Update $\{\omega r\}|R|_{r=1}$according to Eq. (9);

$$\hat{\omega}_r = \left(\frac{o_r o_r^T}{\sigma^2} + \left|\Sigma^{-1}\right|\right)^{-1}\left(\frac{O_r \cdot o_r}{\sigma^2} + \Sigma^{-1}\mu\right). \quad (9)$$

  Update $\{\mu, \Sigma, \sigma^2\}$according to Eq. (13);

$$\hat{\sigma}^2 = \frac{1}{|\mathcal{R}|} \sum_{r \in \mathcal{R}} (O_r - \omega_r^T o_r)^2. \quad (13)$$

end while

Compute aspect importance scores $\{\varpi\kappa\}m_{\kappa=1}$ **End**
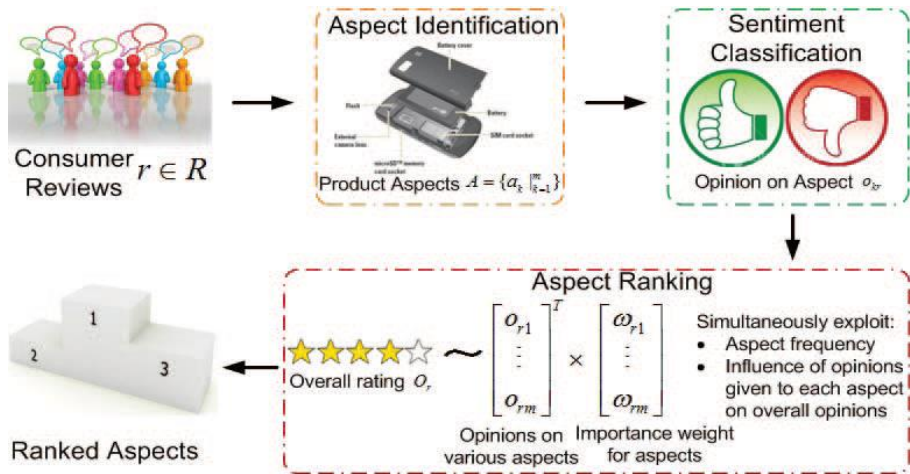

Fig. 3 Flowchart of the product aspect ranking framework [13]
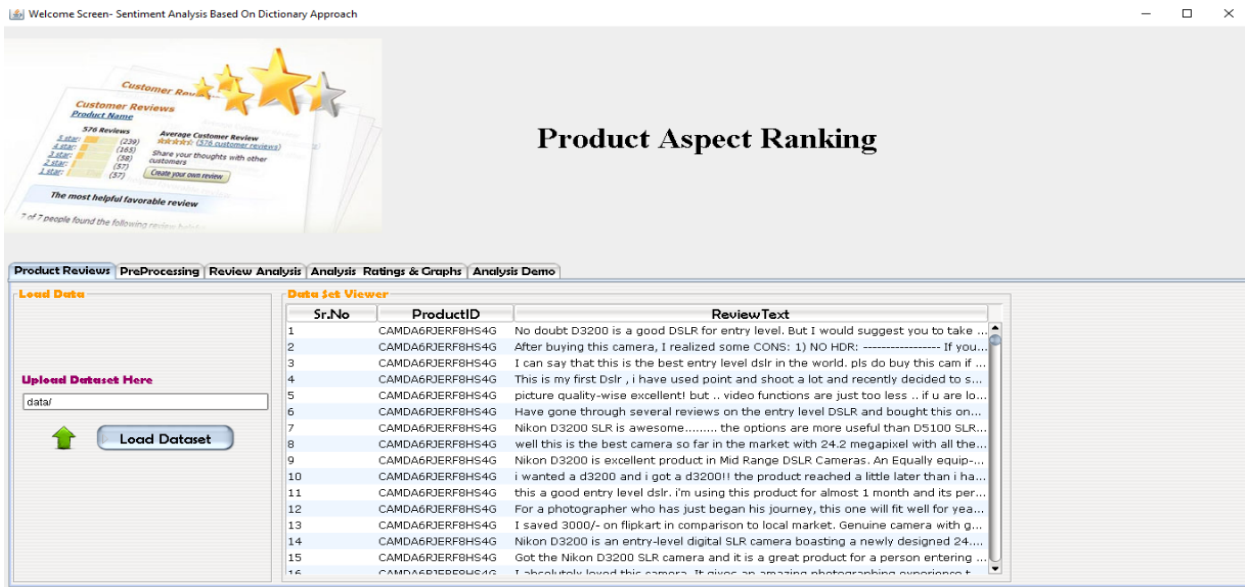
V. EXPERIMENTAL RESULTS

Fig. 4 Product Review Text

Input: - The input of the product reviews dataset.

The above figure represents the product reviews in the form of text. The data set contains the product review text with the product id.

Following figure represents in detail stages included in the preprocessing. There are 4 stages in the preprocessing model;
- Remove @
- Remove URL
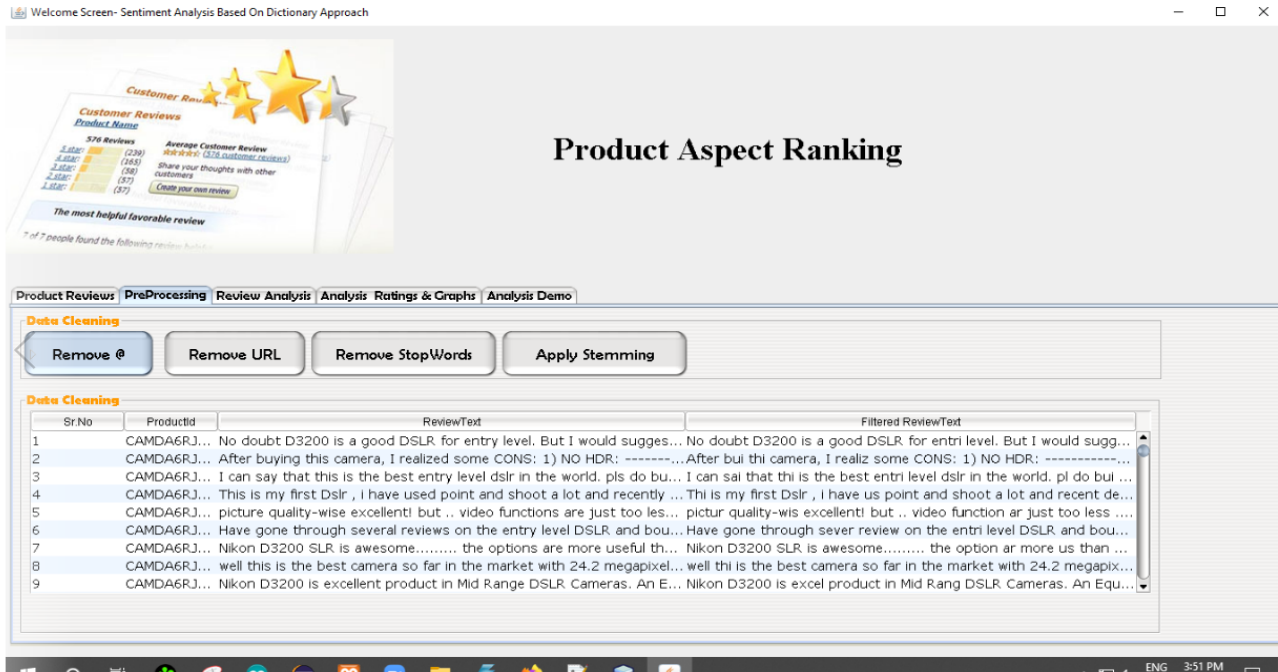- Remove Stop words
- Apply stemming

Fig. 5 Dataset (Product Reviews) Pre-Processing

Following is the GUI of the review analysis. The review analysis is done by considering 3 approaches; The 1st approach is Emoticon Based approach. The second and the most important approach is known as word based approach and the final approach is nothing but the sentiment detection respectively.
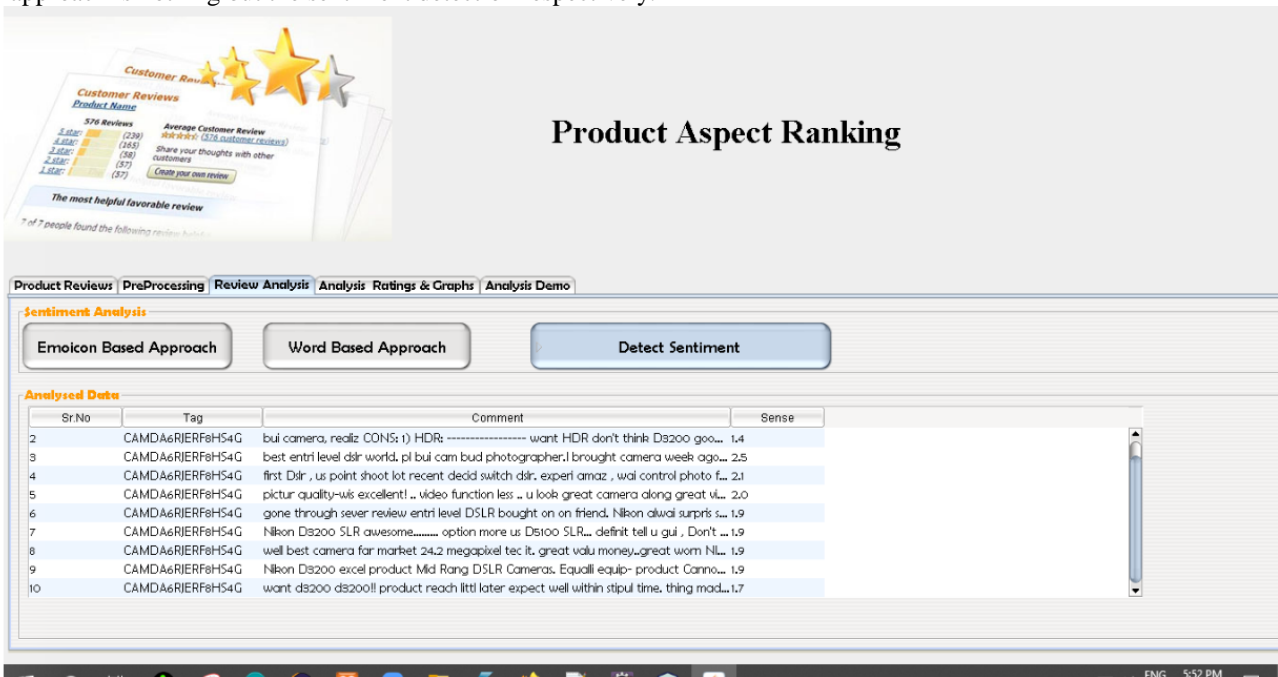

Fig. 6 Product Review Text

The final stage of the Product Aspect Ranking is Analysis Ratings and Graphs. This classifies the result into the 3 categories like +ve, -ve and neutral respectively**.**
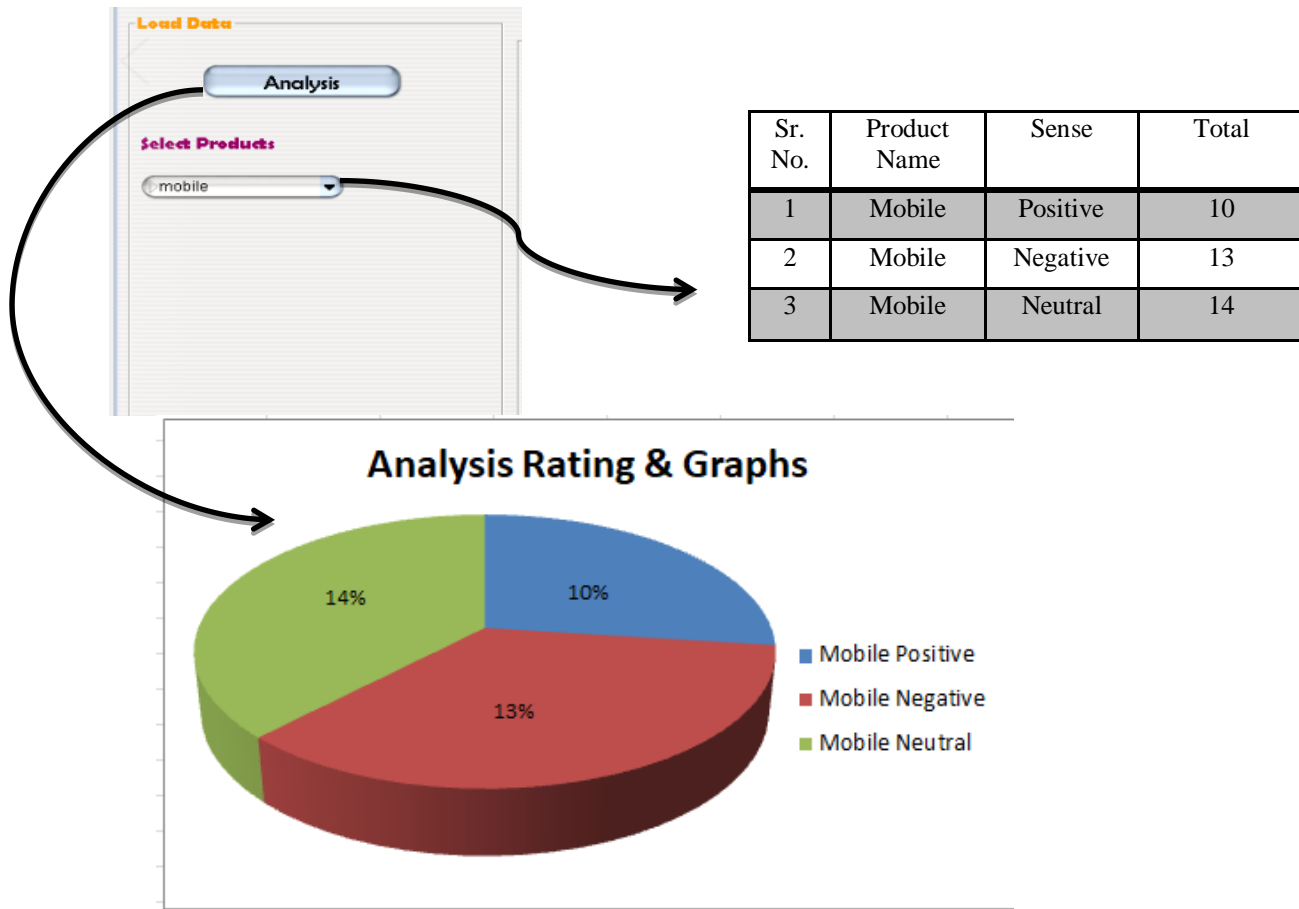
Sr. No.	Product Name	Sense	Total
1	Mobile	Positive	10
2	Mobile	Negative	13
3	Mobile	Neutral	14

Fig. 7 Analysis Ratings and Graphs

VI. CONCLUSION

A significant number of real-world systems benefit from the aspect rating system. Users can use it to make informed buying choices, and retailers can use it to learn about the positive and negative aspects of their products. As the world economy continues to open back up after this tough time of covid, the chance in consumer behavior will still be evident and consumers will continue to use alternative online ways to fulfill their shopping requirements. In the proposed system the data is, analyzed and send to the next preprocessing step. The systems differentiate the data based on the aspect based sentiment. Whereas data collected from different e-commerce website for the sentiment prediction like positive, negative or neutral sense of aspects of the product. The relevant aspects are identified using the Aspect Ranking System.

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