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Recommendation System in E-Commerce Using Machine Learning Methods and Emotional Analysis

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Abstract: *Amazon is an e-commerce website which is beneficial for commercial use. It makes use of commercial website easy, it is accompanied with ratings and review which makes it even more simpler to choose the product. There are all sort of rating, i.e positive, negative, neutral according the product rating is done, the procedure of review and rating are considered to be one of the most important part to reach customer expectations. It is important to analyze the product and recommend accordingly to satisfy user. Decision Trees, Random Forest are implemented to perform sentiment analysis on products based on the reviews given by the customer. It was seen that Random forest gave a higher accuracy of 88.87 percent in detecting the same. Amazon has changed and upgraded over years, It makes selling and purchasing of products online in an efficient manner. It secures the customer details, It also provides fast home delivery and good packing. We are using ensemble classifiers to provide accurate recommendations.*

Keywords: Sentiment analysis, Collaborative filtering, Recommendation system

I. INTRODUCTION

Amazon is one of widely used E-Commerce Website. Amazon has made very easy for people to do Online Shopping easier and faster. It is one of the Efficient way for Buying And Selling Product with ease by just sitting at any Place. With amazon Customer Satisfaction is mainly Focused with the intent to improve its Services. Amazon help Customers who are not satisfied with their products they can easily return their products and also get the refund if they don't want to continue to shop. Being an Extensively used E-Commerce Website, Amazon Receive a wide Variety of Reviews And Ratings on the products that are have being used .The reviews being shared This not only helps the customers to buy the products but also encourage the retailers to understand the details of every product and thereby manufacture them accordingly. The evolution of Amazon has also made things cheaper to buy, so that they remain in the competition of other E-Commerce websites. Customers would now have an advantage of comparing the cost price of products and therefore purchase accordingly.

Problem Definition

Recommendation is what users have done in the past some action is performed based on that we will recommend new product or new things .Based on past actions we will recommend new products or items to the user .We have to give recommendation and it is based on sentiment or emotion so we have to see after recommendation what is the post action .The top popular products and most reviewed products will be recommended to the users . We want to recommend something based on emotional analysis because by doing this the chance of business and revenue increases.

Motivation

The likelihood that a customer will buy a product is closely correlated with the influence of feelings, comments, and reviews. Since user emotions and the product or service are directly related, an analysis of these emotions is necessary in order to resolve the previously mentioned issues. On the other hand, the primary objective of a recommender system is to present a list of products that customers with similar tastes might find interesting. An essential component of the overall success of an online shopping platform like Amazon is the process of assessing client mood and responding to them with recommendations. With all of the issues mentioned in the previous section, the author of the suggested thesis

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wants to create a model that can both analyze client feelings from product purchases and suggest other customers who have similar product preferences. The aforementioned issues were what spurred us to contribute to this field of study.

Methodology

Algorithms for recommender systems and sentiment analysis are two ways to implement the system. This section goes into great detail on two filtering strategies and three machine learning approaches.

A. Decision Tree

The decision-tree algorithm is one of the most common and popular supervised learning-based machine learning algorithms (Haque et al. 2018). Problems with regression and classification are its primary uses for it. It is believed to resemble a tree because of its nodes, branches, leaves, and other characteristics.

· A decision tree's internal nodes, which reflect the features of the dataset, are represented by the root node, which shows the sample dataset that the algorithm is intended to operate on.

B. AdaBoost

Until a point of least loss is reached in areas where boosting combines the weak learners with those of strong learners, an AdaBoost approach continuously trains all of the weak learners to produce an ML model. The successful implementation of the AdaBoost algorithm necessitates the following procedures:

· Examine the original dataset sample for errors · Remove any data that could cause overfitting

· To increase the system model's overall accuracy, provide the classifier the appropriate weights.

C. Collaborative Filtering

The thesis is implemented using a recommender system whose procedure is dependent on a product's level of popularity. Product classification based on this idea is known as popularity-based filtering. It usually suggests to users the things that are in great demand. For example, if a product has positive reviews and is regularly purchased on Amazon, there's a considerable likelihood that a new user will be encouraged to try it. One benefit of employing popularity-based filtering, though, is that the algorithm can suggest things based on the customer's location in addition to the most popular product on Amazon as determined by user ratings. Using customer ratings to assess the implementation process is one of the technique's most helpful aspects, since it eliminates the need for past data.

System Design

The system design of this is likewise explained by two separate diagrams as the implementation is done in two stages. The system design illustrated below shows how the complete implementation of analyzing customer emotions and it is splitted into three sections, each of which has a subsystem that handles the implementation of the system in a different way. The first step in this is to gather a dataset. Next, sentiment analysis is performed by determining the sentiment scores. Lastly, three machine learning methods are used to evaluate the model which are XG Boost, AdaBoost and Decision Tree.

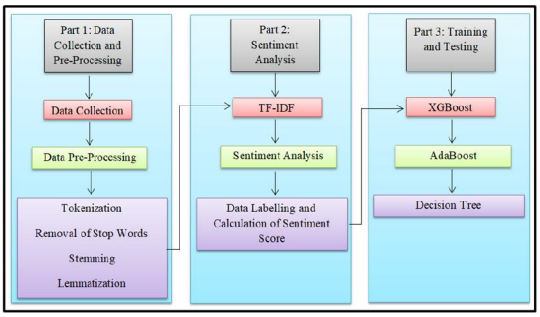

Fig (a): System Design of Product Reviews using Sentiment Analysis

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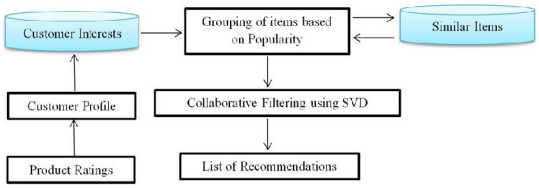

Fig (b): System Design of Product Ratings using a Recommendation System

The diagram above depicts the system design of a Recommendation System for product ratings.

II. RESULTS AND DISCUSSIONS

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Below are the recommended items for user(reviewer_ID = AZZMTAJ61KGGA):

        asin                                              title  \
0  B000FOI48G                        Waterpik Ultra Water Flosser
1  B000GLRREU                        Waterpik Ultra Water Flosser
2  B00G5L867C  Philips Sonicare Sonic Electric Rechargeable T...
3  B0010ZBORW  Urban Spa Moisturizing Booties to Keep your Fe...
4  B001F51RBU            Oral-B Glide Threader Floss (Pack of 4)

                                         description            brand  \
0  [Premium dental water jet with dramatically im...         Waterpik
1  [Premium dental water jet with dramatically im...         Waterpik
2  [Philips Sonicare for Kids Rechargeable Electr...  Philips Sonicare
3  [Considering that the average person walks ove...        Urban Spa
4  [<P><STRONG>Experience The Comfort &amp;amp; Conve...          Oral-B

    price  recomend_score  positive_review  negative_review  neutral_reviews
0             5.042884             7507              556              410
1             4.956315             7102              573              475
2  $8.44      0.004559              875               31               73
3  $7.99      0.004330              985               47               73
4  $22.03     0.003468              235               33               37
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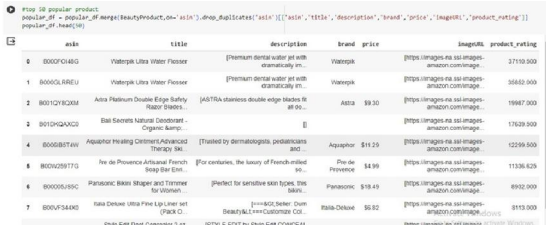

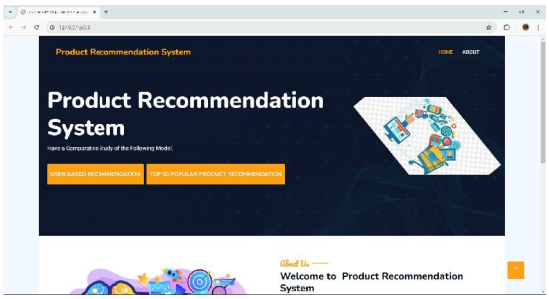

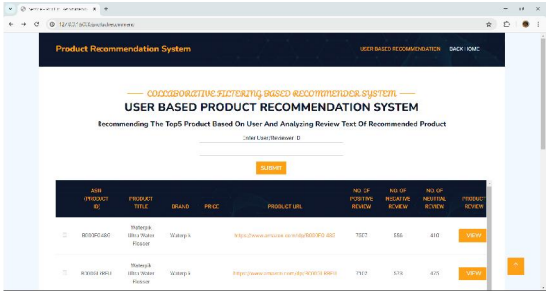

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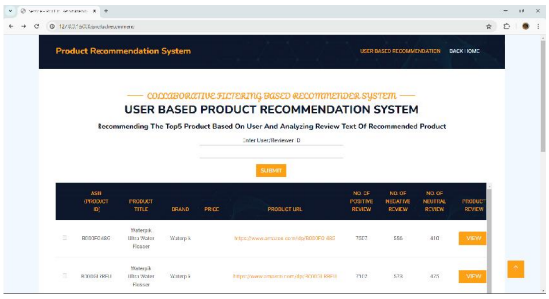

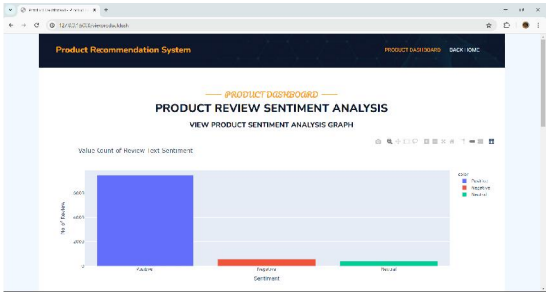

III. CONCLUSION

In conclusion, the fusion of emotional analysis and machine learning in e-commerce recommendation systems holds immense promise. It offers an opportunity for businesses to differentiate themselves in a competitive market by providing recommendations that are not only context-aware but also emotionally intelligent. The journey towards this goal is marked by ongoing innovation, ethical mindfulness, and an unwavering commitment to enhancing the online shopping experience. As technology evolves and emotional analysis becomes more sophisticated.

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