Recommendation and Product Analyzer System for E-Commerce

Ramya Shree B[1,] Nama Venkata Naga Sukesh[2], V.R Rohith[3], Pranav N Rao[4], Sajitha N[5]

[1]Student, CSE, BNMIT, [2]Student,CSE,BNMIT,Karnataka,India
[3]Student, CSE, BNMIT, [4]Student, CSE, BNMIT, Karnataka, India
[5]Assistant Professor Sajitha N, Dept. of CSE, BNMIT, Karnataka, India

---***---

Abstract-*The recommendation system derives a relationship between the products and users to help them to select the most appropriate product and make user decision process faster. This is achieved by using collaborative filtering. This system builds a model that enhances the seller experience by providing the positive and negative reviews given by user directly using sentimental analyzer which makes use of LSTM model for sentiment analysis for better results.*

Keywords- **Recommendation system, collaborative filtering, Product analyzer, sentimental analyzer, LSTM (Long short-term memory).**

1. INTRODUCTION

With the development of technology, many new products are being introduced in the e-commerce platform which is becoming difficult day by day for customer to choose the products out of them. To overcome this problem recommendation system is used as a information filtering system which helps to guess the preferences of a customer and make suggest them based on their interest. Generally, there are many recommender systems such as user-user collaborative filtering recommendation, item-item collaborative filtering recommendation, content-based recommendation and hybrid recommendation.

Collaborative filtering filters the products that user may like based on the characteristics of user group. For example, if person A likes item 1, 2, 3 and B like 2,3,4 then they have similar interests and A should like item 4 and B should like item 1.The algorithm used in collaborative filtering is totally based upon the previous context and doesn't require any additional information.

Understanding the sentiment of the user plays a big role in recommending a product to the other user. This can be done by Sentimental analysis which makes use of LSTM (Long Short-Term Memory) to understand the emotion of the user towards the product he purchased. LSTM is a deep learning technique which remembers the output of the previous step and makes use of it while taking the next input.

2. SYSTEM DESIGN

The proposed system makes use of collaborative filtering and sentiment analysis using LSTM for recommending products for user and it makes use of sentiment analysis to give positive and negative reviews for seller about his product.
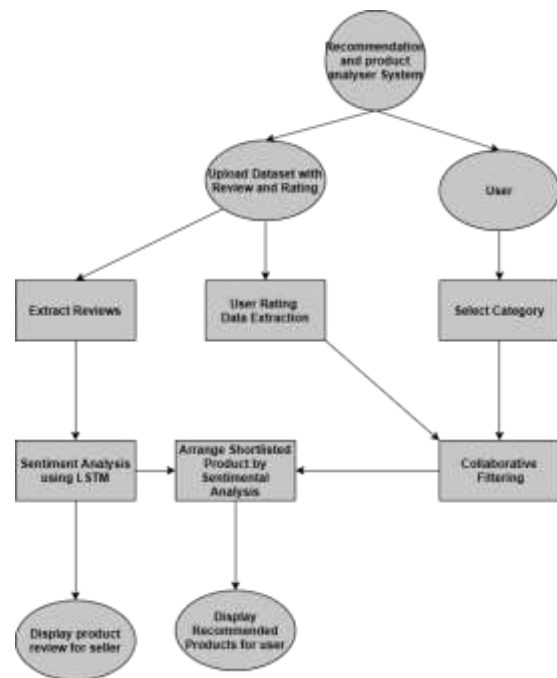

Fig -1: System Architecture

User reviews and ratings will be extracted from this dataset separately. The user data will be extracted from the user ratings and the collaborative filtering is performed based on that user rating and user is asked to select the category which from which seller he prefers buy. The extracted user reviews will be analyzed by sentiment analysis using LSTM. The product which are filtered by collaborative filtering are recommended to user. This sentiment analysis is also used to display the top positive and negative reviews for the seller for his product

3. IMPLEMENTATION

The recommendation and product analyzer system for e-commerce is developed using two methods: Collaborative filtering and sentiment analysis using LSTM (Long Sort-Term Memory).

A. Collaborative Filtering

collaborative filtering is the method of making automatic prediction about the interests of the customer collecting preference information from many other customers. User based collaborative filtering groups the similar users based on the characteristics of the user. The products recommended to one of the users is most likely to be recommended to all other users in the group.
These users can be grouped using cosine similarity which gives all the users who can be grouped.

$$\cos(x, y) = \frac{x.y}{||x||.||y||}$$

B. Sentiment Analysis using LSTM

Sentiment analysis is used in order to understand the sentiment or emotion of the user. LSTM is used for sentiment analysis for better results. LSTM is a deep learning technique which learns the representation of data using different layers. They are used for to avoid the long-term dependency problem. Remembering information for long periods of time is practically their default behavior, not something they struggle to learn.
LSTM cell consists of several gates:

- **Forget gate:** Decides which information should be kept and which should be discarded.
- **Input gate:** Updates the cell state.
- **Output gate:** Chooses what the following concealed state should be.
- **Cell state:** Goes about as an interstate that transports relative data along the succession chain.

The two activation functions used, Sigmoid (squishes values between 0 and 1) and Tanh (squishes values between -1 and 1).

4. RESULTS

The classification performance is calculated by counting the True Positive (TP), False Negative (FN), False Positive (FP) and True Negative (TN).
Recall: It is the ratio of actual positive to the positives classified correctly by the model.

$$Recall = \frac{TP}{TP + FN}$$

Precision: It is the percentage of correctly classified positives by the model.

$$Precision = \frac{TP}{TP + FP}$$

	precision	recall	f1-score	support
0.0	0.82	0.72	0.76	439
1.0	0.87	0.93	0.90	938
micro avg	0.86	0.86	0.86	1377
macro avg	0.85	0.82	0.83	1377
weighted avg	0.86	0.86	0.86	1377

Fig-2: Classification report of sentiment analysis

Accuracy: It tells how close the predicted value is to the actual value. Overall accuracy of Sentimental analysis using LSTM is 86%

$$Accuracy = \frac{TP + TN}{TP + TN + FP + FN}$$

A confusion matrix is a table which is used to describe the performance of a classification model on a set of data whose true values are known.
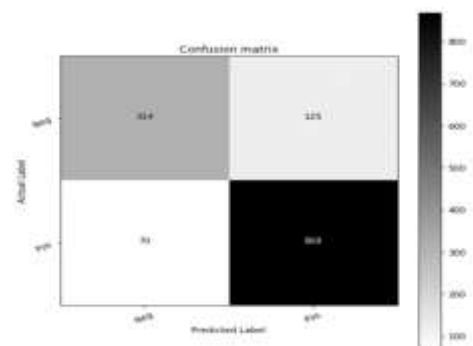

Fig-3: Confusion matrix

The below graph describes total number of different ratings given by users which helps in recommending them the products.
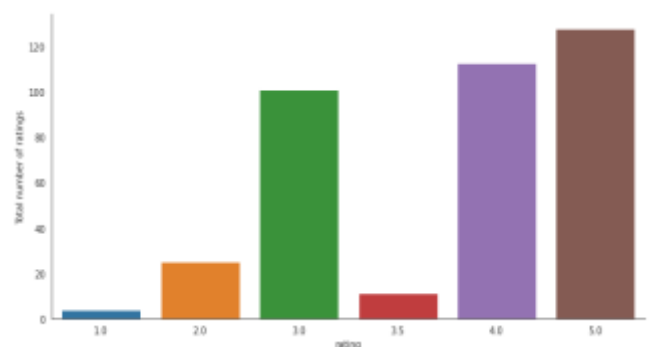

Fig 4: Ratings by users

REFERENCES

[1] TessyBadriyah,Erry Tri Wijayanta,IwanSyarif ,Prima Kristalina, "A Hybrid Recommendation System for E-Commerce based on Product Description and User Profile "2017 The seventh International Conference on innovative Computing Technology(INTECH).

[2] Yuanqing Zhu, Wei Song, Lizhen Liu *, Xinlei Zhao, Chao Du," Collaborative Filtering Recommender Algorithm Based on Comments and Score", 2017 10th International Symposium on Computational Intelligence and Design.

[3] Samundeeswary K, Vallidev Krishnamurthy," Comparative Study of Recommender Systems Built Using Various Methods of Collaborative Filtering Algorithm", 2017 International Conference on Computational Intelligence in Data Science (ICCIDS).

[4] Ashok Tholusuri, Manish Anumala, BhagyarajMalapolu, G. Jaya Lakshmi, Sentiment Analysis using LSTM, 2019 International Journal of Engineering and Advanced Technology (IJEAT).

BIOGRAPHIES

Final Year Computer Science and Engineering Student, interested to work in the domain of Data Analyst

Final Year Computer Science and Engineering Student, interested to work in the domain of Data Science.

Final Year Computer Science and Engineering Student, interested to work in the domain of Data Science.

Final Year Computer Science and Engineering Student, interested to work in the domain of DevOps.

Prof. Sajitha N Working as an Assistant professor in department of CSE BNMIT, Bengaluru, Karnataka, India.