International Conference on

Interdisciplinary Approaches to Engineering and Management

ICIAEM – 2024

13th and 14th June 2024

Recommender Systems and Fake Review Detection in E-Commerce Websites

Vijay Rathi[1] ,Om Chouhan [2], Vishal Kumdale[3], Rajan Prajapati[4]

Tushar Chavan[5] , Saket Deshmukh[6]

1. hod_computer@pgmozecoepune.in (8888870971) 2. omchouhan3011@gmail.com (7020750452)

3. vishalkumdale7@gmail.com (7773936172) 4. rajan115@gmail.com (9545993850)

5.tc648172@gmail.com (7666361436) 6.saketdeshmukh19@gmail.com (8208365096)

Computer Engineering Department, Parvatibai Genba Moze college of engineering,

Savitribai Phule University

Pune, Maharashtra.

*Mohammad Mushaib : sheikhmohammadmushaib09@gmail.com 8853767534

ABSTRACT:

In today's digital world, e-commerce recommendations have become important. They are used to personalize user experience, help customers find what they need quickly and efficiently, and increase business revenue. However, there are some problems with big data-based e-commerce offers. These challenges include limited resources, data expiration dates, cold starts, longevity issues, and scalability. In this article we discuss the challenges and solutions to overcome them. We present some future work to improve the performance of e-commerce recommendations.

Keywords- E-commerce, Recommendation System, Django, *Buying, Selling, Content based filtering, Fake review detection*

I. INTRODUCTION:

In the digital age, the business landscape has undergone major changes as the emergence of e-commerce platforms has changed the way consumers shop and interact with products and services. As the number of products available and the diversity of consumer preferences continues to increase, so does the challenge of matching consumers with the products that best suit their needs. To overcome this challenge, recommendations have become an important tool for e-commerce platforms; It offers users recommendations based on their past behavior, preferences, and publicly available information. Play an important role in the operation of the platform. Leveraging advanced algorithms and machine learning, these

systems analyze large data sets to create recommendations, thus supporting better and more personalized marketing. Whether through collaborative filtering, content-based filtering, or a combination of these, recommendations seek to consider and meet customers' diverse needs and requirements, encouraging loyalty and satisfaction in the process. The importance of recommendations is not only easy to give, but also influences all aspects of customer behavior and decisions. By adjusting product recommendations, e-commerce platforms can influence sales and marketing, increasing customer satisfaction while increasing revenue. Additionally, the approval process is an important tool to overcome information overload and help consumers use a variety of devices with ease and confidence. some challenges and ethical considerations. Issues such as filter bubbles, algorithm biases, and privacy concerns have fueled debates about the transparency, accountability, and integrity of consensus algorithms. There is therefore a growing need to create a more consistent and effective offering that gives consumers freedom, variety and privacy. Explore the principles, methods, uses and values of e-commerce websites. By analyzing current events, challenges, and future directions, this article attempts to shed light on the changing role of constituencies in shaping the future of e-commerce and consumer behavior. By examining the opportunities and challenges inherent in the proposal, this article seeks to provide a deeper understanding of the proposal's impact on the digital economy and all people alike.

II. LITERATURE REVIEW:

Overview of Recommendation Systems :

The literature on recommendation systems provides a foundational understanding of their various types, algorithms, and applications. Traditional recommendation approaches include collaborative filtering, content-based filtering, and hybrid methods, each offering distinct advantages and limitations. Collaborative filtering techniques, such as user-based and item-based filtering, rely on user-item interaction data to generate recommendations by identifying similarities among users or items. Content-based filtering, on the other hand, leverages features or attributes of items to make recommendations based on user preferences. Hybrid methods combine elements of both collaborative and content-based filtering to enhance recommendation accuracy and coverage (Ricci, Rokach, & Shapira, 2011; Adomavicius & Tuzhilin, 2005).

Personalization in E-commerce:

Personalization lies at the heart of recommendation systems, enabling e-commerce platforms to tailor product suggestions to individual user preferences and behaviors. The literature explores various personalization techniques, including collaborative filtering, demographic-based recommendations, and contextual recommendations based on user location or browsing history. Studies highlight the importance of personalization in enhancing user engagement, satisfaction, and ultimately, conversion rates in e-commerce settings (Kumar, Thakur, & Sharma, 2018; Burke, 2002).

Challenges and Ethical Considerations:

Despite their benefits, recommendation systems pose several challenges and ethical considerations that warrant attention. Algorithmic bias, filter bubbles, and privacy concerns have emerged as prominent issues in the literature, prompting discussions on the transparency, accountability, and fairness of recommendation algorithms. Studies emphasize the need for mitigating algorithmic bias, promoting diversity, and safeguarding user privacy to ensure the ethical deployment of recommendation systems in e-commerce contexts (O'Neil, 2016; Abdollahpouri, Burke, & Mobasher, 2019).

Future Directions and Emerging Trends:

The literature anticipates several future directions and emerging trends in recommendation systems for e-commerce. Advances in deep learning, natural language processing, and reinforcement learning hold promise for improving recommendation accuracy and scalability. Additionally, the integration of social networks, real-time data streams, and contextual information presents new opportunities for enhancing the relevance and timeliness of recommendations in e-commerce environments (Zhang et al., 2019; Wang, Wang, & Yeung, 2016).

III. RECOMMENDER SYSTEM:

Content-based filtering (CBF) is a recommendation technique that relies on the characteristics or features of items to make personalized recommendations. Unlike collaborative filtering, which analyzes user-item interaction data, content-based filtering focuses on the intrinsic attributes of items, such as text descriptions, metadata, or user-generated content. By identifying items that are similar in terms of their content, CBF recommends items that match the user's preferences based on their past interactions with similar content.

In content-based e-commerce, recommendations from recommendations are based on the consistency of ratings. That is, the system suggests products that are comparable to the products the customer purchased. The system first calculates the similarity of products using ratings. Measurement of an object Fig. The system then recommends similar products to the customer. Process-based recommendations are easy to create and do not require large files. But their limitation is that they do not include personal preferences.

Advantages:

- Transparency: Since recommendations are based on explicit item attributes, the reasoning behind the recommendations is often transparent and understandable to users.
- No Cold-start Problem for New Users: Content-based filtering can provide recommendations to new users even before they have provided any explicit feedback, based on their stated preferences or interests.
- Diversity: Content-based filtering can recommend items that are diverse in terms of their content, as long as they match the user's stated preferences.

Limitations:

- Limited Serendipity: Content-based filtering may struggle to recommend items that are outside the user's known preferences or interests since recommendations are based solely on item attributes.
- Limited Novelty: Content-based filtering may have difficulty recommending new or unfamiliar items that have not yet been explored by the user, as it relies on the user's past interactions with similar content.
- Over-specialization: Content-based filtering recommendations may become too narrowly focused on the user's past interactions, potentially leading to filter bubbles or lack of exposure to new content.

IV. FAKE REVIEW DETECTION:

The prevalence of fake reviews on e-commerce platforms has become a significant challenge, affecting consumer trust and the credibility of online marketplaces. This paper explores the implementation of a fake review detection system within an e-commerce website built using Django. The proposed system integrates multiple techniques to identify and flag potentially fraudulent reviews. Key features include user authentication, purchase verification, and content analysis using keyword detection to identify inappropriate or misleading reviews. By ensuring that only verified purchasers can leave reviews and leveraging natural language processing to detect suspicious content, the system aims to enhance the

reliability of product ratings and reviews. The methodology and implementation details are discussed, highlighting the effectiveness of combining user behavior analysis with content-based filtering to mitigate the impact of fake reviews on e-commerce platforms. This approach contributes to building a more trustworthy online shopping environment.

Flowchart:

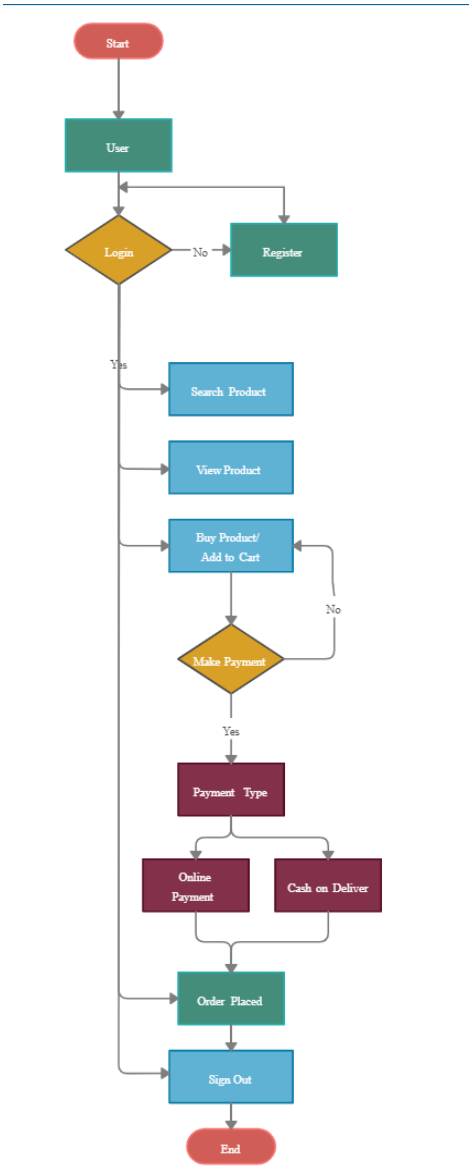

Figure 4.1 Flowchart

This flowchart illustrates the process a user follows to purchase a product from an online store. Here's a step-by-step explanation:

1. Start: The process begins.
2. User: The user wants to use the online store.
3. Login/Register:
   - Login: If the user has an account, they log in.
   - Register: If the user doesn't have an account, they register for a new one.

4. Search Product: Once logged in, the user searches for the product they want to buy.
5. View Product: The user views the details of the selected product.
6. Buy Product/Add to Cart: The user decides to buy the product and adds it to the shopping cart.
7. Make Payment:
   - If the user decides not to make a payment, they return to viewing the product.
   - If the user chooses to make a payment, they proceed to the next step.
8. Payment Type:
   - Online Payment: The user selects online payment methods (like credit/debit card, net banking, etc.).
   - Cash on Delivery: The user chooses to pay with cash upon delivery of the product.
9. Order Placed: After selecting the payment method, the order is placed.
10. Sign Out: The user signs out of their account.
11. End: The process ends.

V. CONCLUSION:

In conclusion, the implementation of recommendation systems in e-commerce websites presents multifaceted challenges, from data quality and scalability to algorithmic bias and privacy concerns. However, by leveraging hybrid approaches, enhancing data quality, and prioritizing user privacy, these challenges can be effectively mitigated. Despite these obstacles, recommendation systems remain indispensable tools for enhancing user experience, driving engagement, and boosting sales in e-commerce. Additionally, integrating fake review detection mechanisms further enhances the reliability of the platform by ensuring the authenticity of user feedback. By addressing these challenges and embracing best practices, e-commerce websites can harness the power of recommendation systems and fake review detection to deliver personalized and relevant recommendations to users, ultimately fostering long-term customer satisfaction and loyalty in the competitive digital marketplace.

VI. ACKNOWLEDGEMENT:

We express our sincere gratitude to everyone who contributed to the successful completion of our project, which integrates Artificial Intelligence (AI) and Machine Learning (ML) into an e-commerce website. We deeply appreciate our project guide, Prof. Shrikant Dhamdhere, for his invaluable guidance and unwavering support. We also thank the faculty and staff of Parvatibai Genba Moze College of Engineering for providing a conducive learning environment and essential resources. Special thanks to Prof. Shrikant Dhamdhere, Professor Head of the Department of Computer Engineering at PGMCOE, Wagholi, for his continuous encouragement. We are grateful to our classmates for their constant support and to our dedicated team members for their unique skills and commitment. This project is a collective achievement, showcasing our ability to work together towards a common goal and advancing AI and ML in e-commerce. Thank you.

REFERENCES:

1. K. R. and W. A. “Electronic Commerce: A Manager’s Guide”,1997 Reading, Addison-Wesley.

2. C. A. Gomez-Uribe and N. Hunt, “The 7etflix recommender system: Algorithms, business value, and innovation,” ACM Transactions on Management Information Systems, vol. 6, no. 4, pp. 1–19, 2015.

3 R. Burke, A. Felfernig, and M. H. Göker, “Recommender Systems: An Overview,” AI Mag., vol. 32, no. 3, pp. 13–18, 2011.

4. J. Iwanaga, N. Nishimura, N. Sukegawa, and Y. Takano, “Improving collaborative filtering recommendations by estimating user preferences from clickstream data”,” Electronic Commerce Research and Applications, vol. 37, 2019.

5. M. Y. Imam, Z.-U.-A. Usmani, A. Khan, and O. Usmani, “A product recommendation system for e-shopping,” in 2021 IEEE Latin American Conference on Computational Intelligence (LA-CCI), 2021.

6. Z. Wang, “Joint social and content recommendation for user generated videos in online social network,” IEEE Trans. Multimedia Apr, vol. 15, pp. 698–709, 2013.

7. B. Smith and G. Linden, “Two decades of recommender systems at Amazon.com,” IEEE Internet Comput., vol. 21, Ji, H. Pi, W. Wei, B. Xiong, M. Wozniak, and R. Damasevicius, “Recommendation based on review texts and social communities: A hybrid model,” IEEE Access, vol. 7, pp. 40416–40427, 2019. Koren, Y., Bell, R., Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8), 30-37.

8. Ricci, F., Rokach, L., Shapira, B. (2011). Introduction to recommender systems handbook. In Recommender Systems Handbook (pp. 1-35). Springer.

9. Su, X., Khoshgoftaar, T. M. (2009). A survey of collaborative filtering techniques. Advances in artificial intelligence, 2009, 4.

10. Adomavicius, G., Tuzhilin, A. (2005). Toward the next generation of recommender systems: A survey of the state-of-the-art and possible extensions. IEEE Transactions on Knowledge and Data Engineering, 17(6), 734-749.

11. Resnick, P., Varian, H. R. (1997). Recommender systems. Communications of the ACM, 40(3), 56-58.

12. Ricci, F., Werthner, H. (2002). Case-based recommendation on the internet. AI communications, 15(3), 147-157.

13. Desrosiers, C., Karypis, G. (2011). A comprehensive survey of neighborhood-based recommendation methods. In Recommender Systems Handbook (pp. 107-144). Springer.

14. Lops, P., Gemmis, M., Semeraro, G. (2011). Content-based recommender systems: State of the art and trends. In Recommender Systems Handbook (pp. 73-105). Springer.

15. He, X., Liao, L., Zhang, H., Nie, L., Hu, X., Chua, T. S. (2017). Neural collaborative filtering. In Proceedings of the 26th International Conference on World Wide Web (pp. 173-182).

16. M. H. Mohamed, M. H. Khafagy, and M. H. Ibrahim, “Recommender Systems Challenges and Solutions Survey,” in 2019 International Conference on Innovative Trends in Computer Engineering (ITCE), 2019.

17. J. Dong, X. Li, and B. Fang, “Community-based recommendations: A solution to the vulnerability problem,” in 2016 12th International Conference on Semantics, Knowledge and Grids (SKG), 2016

18. X. Zhao, “A study on E-commerce recommender system based on big data,” in 2019 IEEE 4th International Conference on Cloud Computing and Big Data Analysis (ICCCBDA), 2019.