

Enhancing User Engagement and Content Relevance: A Novel Approach to Social Media Post Recommendation System

Dnyanesh Hajare¹, Shilpa Jahagirdar^{2*}, Abhishek Humbe³

Abstract

The social media post recommendation system is an innovative solution aimed at optimizing content delivery for users in today's digital age. Its primary motive is to tailor online experiences, ensuring users receive posts most relevant to their preferences. Various machine learning algorithms are employed to suggest related posts. This system leverages advanced algorithms and analytics, producing key results that highlight user engagement metrics and content relevance. Preliminary findings of this study suggest that a bespoke content delivery method significantly enhances user engagement. This system has the potential to redefine social media content recommendations. The primary aim of the system is to enhance user experience by tailoring online experiences to individual preferences. This entails providing users with highly relevant content to boost engagement and satisfaction. The system employs multiple machine learning algorithms to suggest related posts. These algorithms analyze user behavior, preferences, and interactions to generate personalized recommendations. By leveraging advanced algorithms and analytics, the system aims to produce key insights into user engagement metrics and content relevance. Overall, the social media post recommendation system represents a comprehensive and forward-thinking approach to optimizing content delivery in the digital age. By leveraging advanced technology and analytics, the system aims to provide users with a more personalized and engaging online experience.

Keywords: Social media content, recommendation algorithms, user engagement, personalization techniques, Information filtering

INTRODUCTION

Social media platforms have become digital playgrounds, where billions of users create, share, and

*Author for Correspondence

Shilpa Jahagirdar

E-mail: ssjahagirdar.skncoe@sinhgad.edu

^{1,3}Student, Department of Electronics and Telecommunication, Smt. Kashibai Navale College of Engineering (SKNCOE), Pune, Maharashtra, India

²Assistant Professor, Department of Electronics and Telecommunication, Smt. Kashibai Navale College of Engineering (SKNCOE), Pune, Maharashtra, India

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interact with an astonishing variety of textual, visual, and multimedia content. These platforms are treasure troves of data, and this deluge of information can overwhelm users, making content discovery and engagement a formidable task. Recommendation systems have become the answer to this challenge. These systems, underpinned by machine learning algorithms, shift through the vast content available and provide users with personalized suggestions based on their preferences, behavior, and interactions. This tailored duration not only improves the user experience but also significantly contributes to user retention and engagement. In the era of digital connectivity, social media platforms have emerged as dynamic hubs in which individuals engage in a myriad of online interactions and share thoughts,

experiences, and expressions with a global audience. The overwhelming volume of content on these platforms poses a significant challenge for users to shift through and discover relevant and engaging posts. As a solution to this information overload, the advent of social media post recommendation systems has become increasingly crucial in enhancing user experience and satisfaction.

This research paper delves into the intricate world of social media post recommendation systems, aiming to unravel the underlying mechanisms, methodologies, and advancements that drive their effectiveness. In a landscape dominated by ever-evolving user preferences, content diversity, and platform dynamics, the development of intelligent recommendation systems holds immense potential for reshaping the way individuals consume and interact with content on social media.

Through an in-depth exploration of state-of-the-art algorithms, user behavior modeling, and personalized content delivery, this study seeks to contribute valuable insights into the growing body of knowledge surrounding social media recommendations. As we embark on this journey, we aim to shed light on the challenges and opportunities inherent in designing recommendation systems that strike a delicate balance among relevance, diversity, and user privacy.

LITERATURE SURVEY

Previously, Geng et al. in 2015, introduced a deep learning framework for learning representations of user nodes and visual images in social curation networks [1]. The authors applied the resulting model to recommender systems, outperforming other methods on a subset of data of interest. The study suggests leveraging social media data for feature generation as a promising research direction in computer vision. Furthermore, in 2016, Sejal et al. presented an annotation-based image recommendation with an absorbing Markov chain (IRAbMC) [2]. In this study, a Markov chain was incorporated to find relevant links between user queries and annotated keywords. It outperformed existing methods in providing relevant images for user queries. Anandhan et al. conducted a comprehensive review of social media recommender systems (RS) in 2018 [3]. This study investigated recommendation methods, research areas, datasets, data mining techniques, recommendation categories, and performance metrics.

It identified 61 relevant articles out of 434 initial articles. This study offers insight into various recommendation approaches and open research issues in this domain.

Subsequently, Yin and Zhang proposed an image analysis recommendation algorithm based on implicit support vector machines in 2020 [4]. The authors combined image text information and content information for personalized image recommendations. This study experimentally validated the effectiveness of the proposed method in meeting personalized user needs. Subsequently, Fayyaz et al. in 2020, conducted a detailed survey of recommendation systems (RS) focusing on collaborative filtering and content-based, demographic-based, utility-based, knowledge-based, and hybrid-based systems [5]. The authors identified challenges, including cold start, data sparsity, scalability, and diversity. They explored RS applications in various domains such as e-commerce, transportation, e-health, agriculture, and media. Furthermore, Yuheng Hu and Yili Hong proposed SHEDR, a social media-based Hyperlocal Event Detection & Recommendation Framework, in 2020 [6]. The study comprised components such as a tweet fetcher, hyperlocal event detector, and event recommender. The authors demonstrated the effectiveness of detecting and recommending hyperlocal events based on spatial and temporal unusualness. Wan et al. investigated the correlation between user interaction feedback and product marketing images in e-commerce datasets in 2020 [7]. The authors developed a framework to address the potential marketing bias in recommender systems to ensure fairness across market segments. They achieved significant improvements in recommendation fairness while maintaining accuracy.

Subsequently, Yiwei Zhang and Toshihiko Yamasaki Proposed the Style-Aware Image Recommendation (SAIR) framework for social media marketing in 2021 [8]. The authors leveraged

style features to recommend images that were aligned with brand or influencer concepts. They outperformed state-of-the-art methods in recommending conceptually fitted images, as demonstrated through experiments on large-scale Instagram datasets. Furthermore, in 2021, Du et al. studied image recommendation algorithms based on deep learning to improve traditional text-based methods [9]. They developed an image recommendation prototype system that leveraged dimensionality reduction and convolutional neural network (CNN) features. This study investigated individual-level knowledge networks and their influencing factors on social networks.

By 2023, Chakrabarti et al. Introduced TRANSIT, a novel method for hashtag recommendations to enhance social media post popularity [10]. This study utilized word popularity, user popularity, and post popularity for recommendations. It demonstrated significant improvements over existing methods, particularly for low- and average-popularity posts.

Various approaches, methodologies, and advancements in social media recommender systems research, providing insights into current trends and future directions in the field, are summarized here.

METHODOLOGY

Block Diagram

The social media post recommendation system integrates various components: data collection, data processing, analysis, and recommendation delivery. The data collection component fetches user activity, while the processing unit refines the raw data. The analysis segment studies user behavior, and based on these insights, the recommendation delivery unit presents the most relevant content to the user. Seamless integration of the system ensures efficient and pertinent content delivery. The social media post recommendation system is a complex system that integrates various components to deliver relevant content to users. The data collection module gathers user activities, including the posts they like, comment on, and share. The processing unit then cleans the raw data by eliminating duplicates and irrelevant information. The analysis segment then studies user behavior to identify patterns and trends. Based on these insights, the recommended delivery unit presents the most relevant content to users. Seamless integration of the system ensures efficient and pertinent content delivery. The system is designed to improve the user experience by providing users with content that they are more likely to be interested in. This helps users save time by eliminating the need to search for content themselves and enables them to discover new content that they might not have found otherwise. The system is also designed to help businesses reach their target audience more effectively by providing them with a way to promote their content to users who are likely to be interested.

Flow Chart

The flow for the social media post recommendation system is as follows (Figures 1 and 2):

1. *Data collection*: The system gathers data on user activities, such as the posts they like, comment on, and share, from various sources, including social media platforms, websites, and apps.
2. *Data processing*: The gathered data were processed and cleaned to eliminate duplicates or irrelevant information. The data were then normalized and formatted into a structured format.
3. *Data analysis*: The analyzed data were examined to uncover patterns and trends in user behavior. This analysis was conducted to develop a model that could be used.
4. *Recommendation delivery*: This model is used to recommend posts to users. Recommendations are delivered to users through a variety of channels, including social media feeds, emails, and push notifications to predict the posts in which a user is likely to be interested.

RESULT AND DISCUSSION

Figure 3 is provided as input to our model, and it generates the following results. The image shows the scenery of the autumn months. There were many trees with yellow leaves in the images. There is also a dirt road passing through dense trees. The model provides the following output for the given Figure 4.

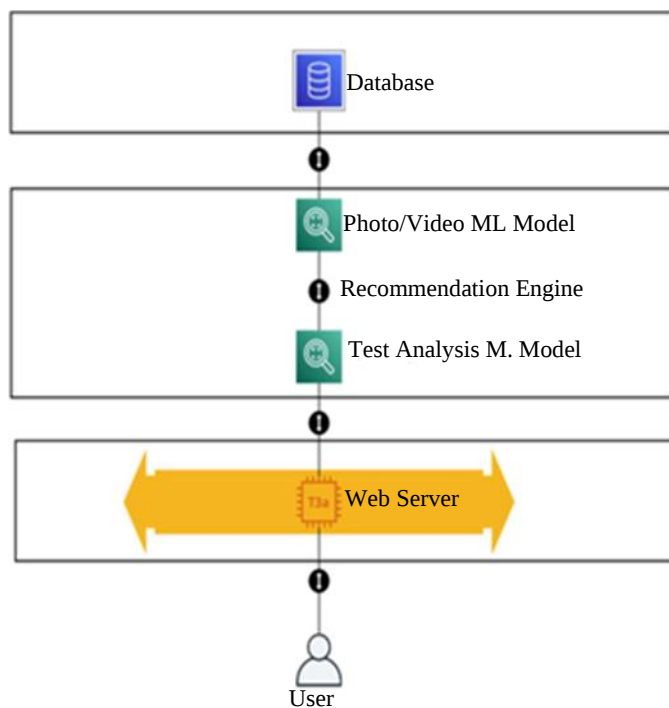


Figure 1. Block diagram of social media post recommendation system.

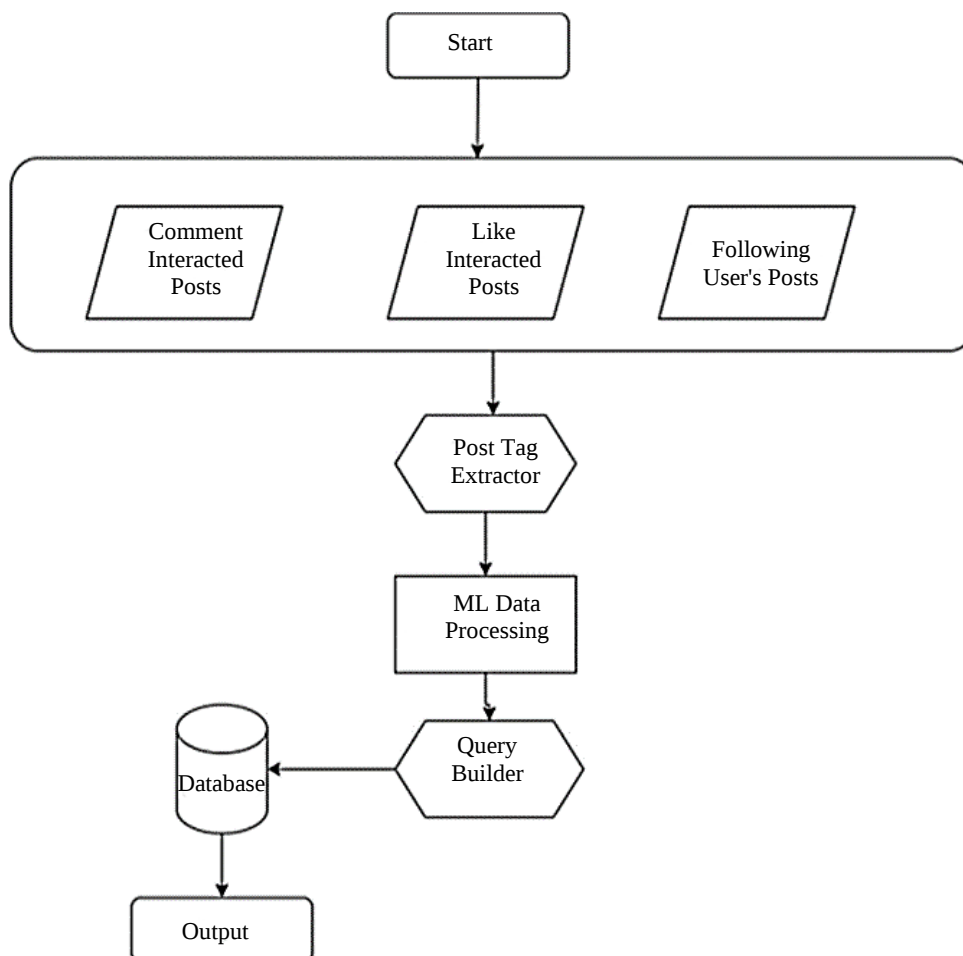


Figure 2. Flow diagram of social media post recommendation system.



Figure 3. Input Image.

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

aniket@Mac-Station-Pro-Plus aws-rekon-to-twitter % node .
Processing: pexels-pixabay-33109.jpg
(node:25668) NOTE: We are formalizing our plans to enter AWS SDK for JavaScript (v2) into maintenance mode in 2023.

Please migrate your code to use AWS SDK for JavaScript (v3).
For more information, check the migration guide at https://a.co/7PzMCcy
(Use `node --trace-warnings ...` to show where the warning was created)
Detected Labels: [ 'Autumn', 'Leaf', 'Plant' ]
aniket@Mac-Station-Pro-Plus aws-rekon-to-twitter %
```

Figure 4. Output Terminal.



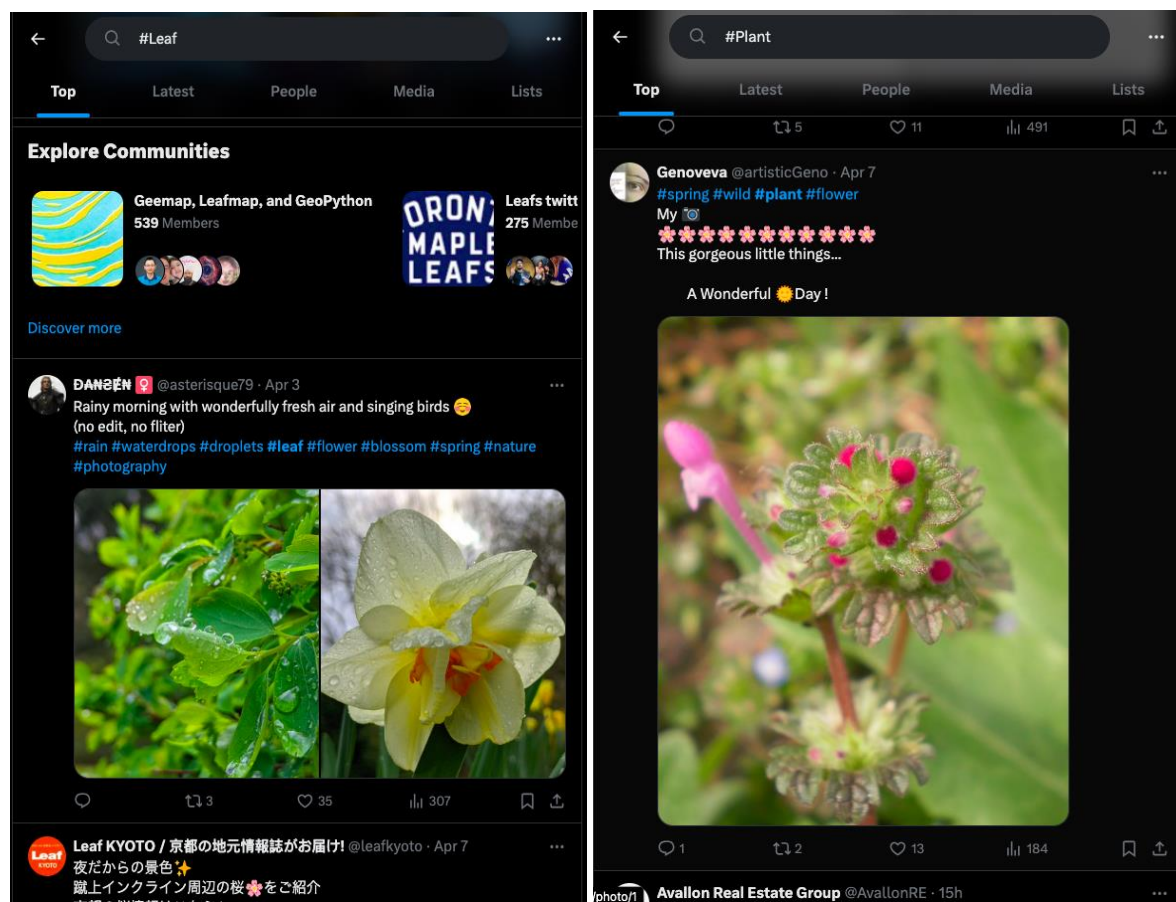


Figure 5. Social Media Tag Searches.

As you can see in the above terminal, the model gave ‘Autumn,’ ‘Leaf’, and ‘Plant’ which correctly describes the input image. We are also searching for tags provided by a model on social media. As per API availability, we perform these searches on X (formerly known as Twitter). The screenshots are shown in Figure 5.

CONCLUSION

The social media post recommendation system bridges the gap between vast content availability and user preferences. It promises a refined user experience and offers platforms a way to retain and grow their user bases. This dynamic recommendation system curates social media posts according to user preferences and browsing history.

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