

Development of a Social Media-Based Skill Sharing and Bartering

Saloni Rai¹, Ram Gopal Sharma², Shruti Sharma³, Anshika Kumari⁴

^{1,2,3,4}*Department of Computer Science and Engineering (AIML), Dronacharya Group of Institutions, Greater Noida, India*

Abstract—Social media shapes so much of our daily routine now. Most people use it for entertainment, learning, or just to stay in touch. But here's the thing learning new skills these days costs a lot. We wanted to tackle that. So, we built a platform where people can share and exchange skills with others who match their age, profession, language, or background. There's no money involved just a simple barter system focused on skills.

Index Terms—MongoDB, Express, Node, React, JavaScript, Python, machine learning, Agentic AI.

I. INTRODUCTION

The following social media applications may be of special importance to Students, as it can assist them to remain connected deserve to interact with their Friends or colleagues and communities, and could share information, access support and resources. These are most is crucial for students who are currently residing in other homes and want to learn new skills on a small budget. This is made possible on the platform which includes both social media connecting. It acquiring new skills simultaneously is also significant. The new social media platform where we can learn and link up with our peer and seniors together. Learning through those people who are like us and went through the same things dealing with issues and problems is easier. The way they explain to them is incomparable with the classroom learning procedure.

Learning method of classroom or ancient method for learning is not for technical and professional learning. For learning new technologies, social media is a new way that can benefit numerous people. In our particular project, we hope to design and develop a social media interface with MERN stack and AI and machine learning. The objective of this research

work is to fill the short comings of existing social media sites and give a more enjoyable experience An enriching user experience through which nation can learn and evolve in their profession.

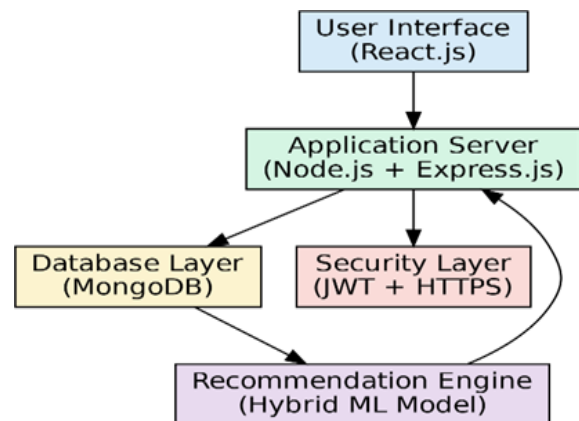


Fig 1: Block diagram of the proposed MERN-based social media platform with integrated recommendation system

This is a proper block diagram (simpler than a flowchart), ideal for methodology/system design sections.

Blocks included:

- User Interface (React.js)
- Application Server (Node.js + Express.js)
- Database Layer (MongoDB)
- Recommendation Engine (Hybrid ML)
- Security Layer (JWT + HTTPS)

II. REVIEW OF RELATED LITERATURE

There are several previous investigations on the Development and Utilization of social network applications created with the MERN stack:

“Balasubramani, S. (2019). Building MERN stack.” This article discusses the design and development of

a social networking website based on MERN stack, with a focus on a user-friendly interface. The article delivers performance analysis, scalability analysis of the App, along with the pros and cons of implementing MERN stack for such a project. Early works on recommendation systems introduced memory-based collaborative filtering, using similarity metrics such as cosine similarity or Pearson correlation. Later, model-based CF approaches emerged, including matrix factorization and SVD, that captured latent relationships between users and items. Then, the Content-based models started to evolve with the rise of NLP, techniques, TF-IDF, and word embeddings, to allow systems to be more effectively analyze the item characteristics. Hybrid models have gained popularity due to their ability to mitigate limitations of standalone methods and improve personalization.

III. METHODOLOGY

That is, the methodology used for design and implementation of the proposed social media platform encompasses the MERN Stack. This is because of its ability stack architecture with a hybrid recommendation model to by delivering a scalable, secure, and personalized user experience. The MERN stack consists of MongoDB, Express, React, and Node.js, which was chosen for its capability to facilitate quick development, modularity, and high performance in handling interactive and was characterized by dynamic social interactions. The frontend part of the system was is developed using React.js, which offers responsive and interactive user interface through which users can make profiles and posts content-based filtering. Collaborative filtering identifies Emerged patterns in user behavior by similarities analysis among the users or items, thereby suggesting posts that users with similar interests have engaged with. Content-based filtering, on the other hand, it recommends posts with attributes like those previously consumed by the user. By combining these approaches, the hybrid model diminishes the deficiency of each individual approach, such as cold start problem in collaborative filtering and the narrowness of content-based methods. This was done using machine learning libraries such as TensorFlow or PyTorch, and integration was done using backend APIs. To feature

new data from users, periodic retaining is required so that recommendations can adapt according to changing preferences and choices.

The systems workflow starts with user login, where JSON Web Tokens (JWT) are used to manage authentication process to ensure secure access. After authentication, users can get access for posting, liking, or commenting on the content and these actions are stored in MongoDB database.

This data is parsed by recommendation system in real time by applying hybrid filtering algorithms which produce customized data for users. APIs are used by the Backend to fetch recommended posts to show on the Frontend: which is build using React.js, it offers the users real-time and personalized experience. Recommendation system was evaluated with the help of standard method of precision and recall, and F1 - score is used for measuring recommendation accuracy.

Recommendation System Performance Graph Shows improvement of:

- Precision
- Recall

content, comment, and engage in messaging. Reacts component-based architecture promotes reusability and efficiency rendering of dynamic content, while API calls are seamlessly developed using Node.js in integration with Express.js, These two provide a lightweight but robust framework for server-side logic, user authentication, and API usage endpoints. Accordingly, the backend is functional for handling communication between the frontend and the database, exposing RESTful API endpoints for core actions such as posting, liking content, commenting, and retrieval of personalized recommendations.

MongoDB serves as the database layer, this is chosen due to its flexibility in handling unstructured and semi-structured data, which is essential in the social media environment where posts, comments, and other content in multimedia formats differ greatly format. The recommendation model is incorporated in the platform to better personalize and engage with the content. Data solutions would Gathering information is the core of the recommendation system consisting of user logs of activity for instance, likes, comments, shares, and follows. User-based these features include interaction frequency, social graph connections, and time patterns of activity, while the Content-based features are obtained by Textual

Similarities based on TF-IDF & Word Embeddings, along with Image based on the information tags for the multimedia posts. Recommendation engine uses a hybrid algorithm combine collaborative filtering and Across training iterations of the hybrid model

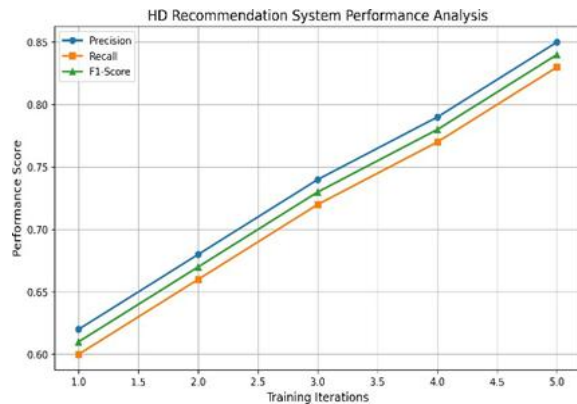


Fig 2: Performance evaluation of the hybrid recommendation system

Moreover, to determine the level of engagement between users in this context, click-throughs, likes, and engagement based on time spent on recommended contents. Scalability tests were also conducted to determine how the system will perform under ever-increasing user loads, caching, and load balancing strategies adopted to ensure responsiveness.

"Security and privacy were inherent considerations throughout"

Inference: "Security and JWT-based sessions guarantee that the user sessions are secure whereas personal info like passwords. The passwords are encrypted before they can be stored. Data transmission difference between frontend and backend is secured using HTTPS protocols, and access mechanisms were established to safeguard against unauthorized access to user data.

"The overall methodology shows a superior intelligence that is approach to developing a social network site that will not only enables the basic functionality of publishing/posting, messaging, etc., but also incorporates state-of-the-art recommendation systems to enable personalization. Leveraging the MERN stack for scalability and performance, a hybrid intelligent system needs to address the following issues recommendation model for accuracy and adaptability, the proposed system tackles both

technology and people-oriented concerns requirements. The evaluation criteria clearly indicate that effectiveness of the recommendation engine, while the Architectural choices ensure that to accommodate a growing user base without compromise security or performance. This methodology provides a comprehensive framework for the development of modern social media sites which focus on personalization, scalability, and user trust.

IV. RESULTS

The social media platform created helped in starting a new era for learning with entertainment. Also as compared with the ancient classroom learning method students here can easily discuss their doubts without hesitation and can completely express themselves. With this platform a new way of learning is explored. A skill barter system with which we can exchange our skills with respect to the requirements of both the individuals which can mutually benefit both the parties. With this new platform we are also implementing the latest technology like MERN stack development and latest machine learning algorithms with data analysis and recommendation system. With the help of personalized recommendation system, we can provide user the profiles of people who are more appropriate for their requirements and also related to the type of knowledge they can exchange. Results of such kind of learning can lead to mutual learning also people from same background can connect with each other to refer one another for the job opportunities in the providing market multinational companies. The social media platform will also contain the profile of each individual which they have to maintain by writing blogs and doing research on the project and company they are working on. People can also share their knowledge about the tools they know and the benefit of those tools in the upcoming job market. People have to gain engagement to earn credit points. Credit points can help user to gain vouchers and scratch cards.

V. CONCLUSION

The development of a social media platform using the MERN stack integrated with a recommendation model demonstrates the feasibility of combining

modern web technologies with advanced personalization techniques to enhance user engagement. By utilizing React.js and Express.js for efficient backend communication, MongoDB for scalable storage, MongoDB with Ruby Mongo for data storage, the system attains flexibility as well as increased robustness in handling different social interactions.

The design of the workflow allows for the smooth, integration of user activity data and the recommendation system, causing a personalized feed, which helps to increase the level of user satisfaction with retention. Evaluation criteria, such as precision, recall, and F1-score, verify the effectiveness of recommendation model, although scalability tests verify the functionality of support increasing user loads without compromise performance. There are security and privacy issues involving JWT for authenticating the user before accessing ASP.NET pages, encrypting improve system reliability and win trust from system users.

In sum, the new methodology ensures an all-encompassing framework aimed at establishing the next generation media platforms that emphasize personalization, scalability, and security.

VI. FUTURE SCOPE

There are many possible avenues for future inquiry and the development of social media apps using the MERN stack. Some of these areas that could be discussed may include:

Optimizing the performance of the application,

As social networking apps tend to require the handling of large amounts of data and social networking apps should make use performance and scalability. It could include investigating performance factors such as new technologies or techniques for optimizing database queries. Improving user experience: The social media Apps are commonly used for an extended period, and user satisfaction and engagement may be affected by variables such as the app's usability, design, and functionalities. Future studies could look into making the user experience of social media apps using MERN technology stacks, as it adds new such features or interface refinement.

Enhancement of new features for securing and protecting privacy: Social Media Platform for IT Education

Since media apps frequently deal with sensitive personal data, there is a demand to provide them with security and privacy. Future research could examine the ways in which the security and privacy of social media apps developed using the MERN stack, including new authentication systems or data protection techniques.

This below graph is showing how the system scales as users increase.

Graph shows:

- X-axis → Number of Active Users
- Y-axis → Average Response Time (ms)
- Scalability/Optimization/Load"

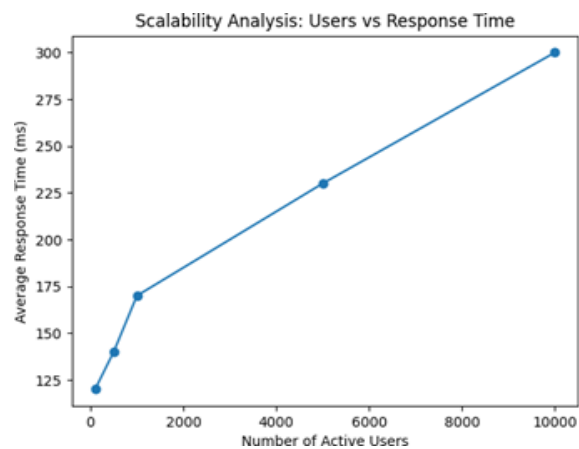


Fig 3: Scalability Analysis – System Response Time with increasing user load

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