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SKILLMATCH: PERSONALISED CLASSES & JOBS HUB

Prof. Jagtap V.G.[*1], Madhura Khande[*2], Ritesh More[*3], Akash Mulik[*4], Mahesh Shinde[*5]

[*1]Professor, Department Computer Engineering, SVPM's College Of Engineering, Malegaon Maharashtra, India.

[*2,3,4,5]Student, Department Computer Engineering, SVPM's College Of Engineering, Malegaon Maharashtra, India.

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ABSTRACT

In today's competitive environment, skill development and access to quality education are crucial for career advancement. Numerous online course recommendation systems have been created in the field of personalized course-learning services to meet the various needs of students. However, the abundance of options of offline classes can also create confusion and make it difficult for students to decide on classes to be taken, especially when considering their career aspirations. However, despite these advancements, there still exist three unsolved challenges: 1) how to effectively recommend the offline classes if students want to search offline classes. 2) how to identify the high-correlated classes in the class corpora. 3) Offline classes recommendation on various platforms may contain fake reviews & ratings. To address this problem, the proposed system introduces an integrated offline classes and jobs recommendation system that utilizes machine learning techniques like knowledge graph, Natural Language Processing, decision tree to suggest relevant courses and employment prospects according to the student's interests, abilities, and professional objectives. An offline course recommendation system uses user skills and class information content, ratings & reviews to suggest personalized classes. Our system uses MERN Stack technology & ML algorithms like Natural Language Processing for review analysis & Knowledge graph to make personalized recommendations. System can authenticate the ratings & reviews given by students to respective classes. The job and course recommendations are the two main components of the system. The course recommendation feature makes recommendations for appropriate classes to the student based on their interests and profile. The job recommendation component helps students find appropriate jobs based on their qualifications, experience, and desired careers. The suggested classes and job suggestion system may help students make well-informed choices regarding their educational and professional pathways. Furthermore, the system can be extended to recommend offline classes with data given by users like location i.e. if users want to search classes within specific areas.

Keywords: Offline Class Recommendation, Job Recommendation System, Natural Language Processing (NLP), Knowledge Graph, Student Interests, Class Ratings And Reviews.

I. INTRODUCTION

The modern job market is fiercely competitive and ever-changing. To thrive in this dynamic environment, people must continuously update their knowledge and skills through a variety of courses and training programs. With so many options available, it can be difficult for people to select the ones that will best suit their career goals and aspirations. This paper suggests developing a system called Learner's Onboard that uses machine learning algorithms to offer personalized recommendations for classes and job opportunities based on the user's skills, interests, and career aspirations. The quantity of offline educational information has grown significantly in recent years. As a result, the sheer number of classes and resources available to them frequently overwhelms students. In this case, the course suggestion system is extremely important in assisting students in making informed selections regarding their education.

In today's fast-evolving education landscape, personalized learning experiences and effective career guidance are becoming essential for students to achieve their academic and professional goals. To address these needs, our project introduces a comprehensive system with three distinct user interfaces designed for students, instructors, and administrators. Students can create personalized profiles and explore a variety of offline classes tailored to their interests and skill development. Instructors of offline classes can easily upload and manage information about their course offerings, making them accessible to students seeking relevant learning

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opportunities. The system's administrator plays a pivotal role by maintaining the platform's integrity, overseeing student and class profiles, and ensuring the authenticity of reviews and course content. Admin verification ensures the genuineness of student feedback and the credibility of available classes. Moreover, enrolled students have the ability to review the classes they attend, further enhancing the platform's reliability.

A key feature of our system is the integration of a job recommendation module, which leverages machine learning techniques to assist students in identifying relevant job opportunities based on their skills and career aspirations. This job recommendation system serves as a bridge between skill development and career advancement, offering tailored suggestions that help students align their learning experiences with their professional goals. Our project thus provides a holistic platform that not only connects students to educational resources but also helps them navigate their career pathways effectively.

In section 2, literature survey is discussed. Section 2 contains sub-sections like related work, system architecture, proposed system, expected results etc. Section 3 presents conclusion.

1.1 MOTIVATION

In today's rapidly evolving educational and professional landscape, the demand for targeted skill development and access to quality offline education resources has become critical. While online course recommendation systems have made significant strides in personalizing learning experiences, the sphere of offline class recommendations remains underexplored, leaving students with limited guidance in selecting in-person learning opportunities aligned with their career aspirations. This gap presents several challenges, such as the overwhelming volume of class options, inconsistent quality control, and the potential for misleading reviews and ratings. These issues highlight an urgent need for an advanced, personalized solution capable of delivering reliable offline class recommendations.

Our proposed system introduces an innovative approach to addressing these challenges by leveraging machine learning techniques like knowledge graphs, Natural Language Processing (NLP), and decision trees. Through these methods, the system can provide tailored recommendations based on students' skills, interests, and educational goals while verifying the authenticity of class reviews and ratings. Furthermore, by incorporating location-based filters, the system offers students the flexibility to find relevant offline classes within their specified areas. This solution stands to empower students in their educational journeys by promoting informed decision-making and enhancing the overall accessibility and credibility of offline educational resources.

II. LITERATURE REVIEW

Literature Survey Table

Paper No.	Technology Used	Advantages	Disadvantages
[1].	Knowledge Graph, Deep Learning, Attention Mechanism	- Effective course recommendation leveraging both title- and keyword-level knowledge graphs.	- High computational complexity due to cascaded fusion network. -Limited to platforms with rich course data like XuetangX.
[2]	Learning Management System (LMS), collaborative filtering, knowledge-based recommendations	- Reduces information overload - Offers potential for scalability - Enhances student engagement by	- Requires extensive user data to be effective - May struggle with accuracy - leading to a "cold start" problem.
[3]	-TF-IDF for vectoring text data -Natural Language Processing -Cosine similarity	- more informed course choices - course recommendations tailored to individual user preferences.	-it may not capture diverse user behaviors -accuracy of recommendations m vary depending on the detail and relevance of course

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			metadata.
[4]	- (DCNN) -Harris Hawks Optimization (HHO) for feature extraction	- High accuracy (94.4%) in recommending courses. -Effective feature extraction using HHO	- Computational complexity and high resource requirements -Requires a substantial amount of labelled data
[5]	-K-means clustering algorithm -TF-IDF (Term Frequency-Inverse Document Frequency)	- Uses clustering to reduce information overload -making it viable even when student behavior data is unavailable	-Limited adaptability - limit recommendation accuracy where text descriptions are ambiguous or insufficient.
[6]	Content-Based Filtering, Collaborative Filtering	- It reduces information overload - enhancing focus, motivation - helping students to find resources that align closely with their needs	- raises privacy concerns - challenges with real-time adaptability -The system's reliance on historical user data might limit adaptability
[7]	Collaborative Filtering, Naive Bayes	- Hybrid recommendation approach improves relevance for courses and jobs.	- Limited by accuracy constraints of collaborative filtering and Naive Bayes. -Challenges in scalability with large datasets.

2.1 RELATED WORK

Cascaded Knowledge-level Fusion Network (CKFN) to improve personalized online course recommendations in MOOCs. The CKFN approach addresses three key challenges: (1) efficiently utilizing course information from both high-level titles and more specific keywords, (2) capturing the sequential nature of course progression, and (3) identifying courses with strong correlations. CKFN incorporates two main knowledge graphs—one for keywords and another for titles—to capture multi-level course information. Additionally, a two-stage attention fusion mechanism is used to enhance the combination of course details, and a knowledge-aware negative sampling method is applied to improve recommendation precision. Experimental results on the XuetangX dataset show that CKFN significantly outperforms other baseline models, highlighting its effectiveness in delivering personalized recommendations and its potential for deployment in MOOC platforms. This method advances course recommendation accuracy and relevance, making it a valuable approach for large-scale online learning platforms. [1].

The research explores how personalized recommendation systems can enhance online learning platforms, particularly Learning Management Systems (LMS). They analyses methods like collaborative and content-based filtering to deliver customized learning experiences by recommending content that aligns with each learner's profile and interaction history. Their study addresses challenges such as user disengagement and information overload, suggesting that personalized recommendations improve motivation and engagement. This work underscores the growing need for adaptive learning technologies that cater to diverse learning styles and preferences. [2].

Online course selection by analyzing course attributes and user preferences on Coursera and Udemy. Using content-based filtering and cosine similarity, it recommends courses closely aligned with user interests. Data preprocessing and visualization further improve the system, allowing users to make informed choices in navigating a vast course catalog. The system's focus on personalized course recommendation supports online learning by simplifying the decision-making process for learners. [3].

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This paper proposes a course recommendation model combining DCNN and Harris Hawks Optimization to enhance feature extraction and classification. By leveraging deep learning and optimization, the model achieves high recommendation accuracy, outperforming traditional models like CNN and LSTM. This integration optimizes course recommendations based on the students' academic history and improves learning engagement by offering personalized guidance in course selection. [4].

This study addresses the challenge of information overload in MOOCs by creating a recommendation system that clusters courses based on similarity in textual content. Using the K-means algorithm and cosine similarity, it groups related courses, aiding students in selecting relevant courses that align with their learning goals. The system is especially useful where behavioral data may be sparse or unavailable, as it relies on course descriptions rather than user interaction history.[5].

The authors examine how personalized recommendation systems can enhance Learning Management Systems (LMS) by tailoring content to individual learner profiles. They discuss how methods like content-based and collaborative filtering enable these systems to recommend learning materials, models, and strategies based on each user's preferences and behavior. This approach aims to address challenges in online learning, such as information overload and engagement, by making content delivery more relevant and personalized, ultimately improving student motivation and learning outcomes. [6].

This project proposes an integrated course and job recommendation system that uses a hybrid machine learning approach combining Naïve Bayes and collaborative filtering to provide personalized recommendations. The system comprises two main components: a course recommendation module that suggests courses aligned with a student's profile and interests, and a job recommendation module that identifies job opportunities suited to the student's skills, experience, and career goals. By tailoring recommendations to the individual's aspirations and competencies, the system aims to guide students in making informed choices about their educational and career paths. The authors also suggest that the system could be enhanced by incorporating additional data sources, such as student feedback and job market trends, to improve recommendation accuracy and relevance. [7].

This paper presents an online course recommendation method that enhances recommendation accuracy by incorporating both user-course interactions and course descriptions. The approach uses the LightGCN model to represent user-course interaction data, generating structural embeddings that capture relationships between users and courses. Additionally, it leverages the BERT model to process course descriptions, deriving detailed description embeddings. These embeddings are combined using the Attention Neural Factorization Machine (ANFM) model, which models both low-order and high-order feature interactions and applies an attention mechanism to optimize feature weighting. Experiments on a real-world dataset demonstrate that this method outperforms baseline models in terms of NDCG, Recall, and Precision, underscoring its effectiveness in delivering more relevant course recommendations. [8].

This paper introduces a dual-function system that includes a course recommendation feature and a resume builder, aimed at supporting first-time job seekers. The course recommendation component uses a hybrid approach combining content-based and popularity-based filtering to suggest courses. Content-based filtering analyses user preferences and course content, while popularity-based filtering recommends highly-rated courses. The system is built using technologies such as Python, PHP, JavaScript, HTML, CSS, and Streamlet for the user interface. Its design provides users with a tailored experience, offering relevant course suggestions for skill enhancement and a streamlined resume-building process to align with their career objectives. [9].

III. SYSTEM ARCHITECTURE

The paper shows how the MERN stack works by combining MongoDB, Express.js and Node.js to create an easy-to-use platform. React is used to build the user interface providing a responsive design for smooth interactions between students, class instructors and Admin. The layout includes features like login forms, classes list, enrolled classes list and job listings that update in real time making it easy for users to stay engaged. Good state management ensures that user inputs are saved and carried across different parts of the application.

On the server side used Node.js and Express.js to build a backend that simplifies communication with the database. The Express framework handles HTTP requests allowing class instructors to post courses, register students and manage applications easily. This paper integrates middleware to ensure class reviews & ratings

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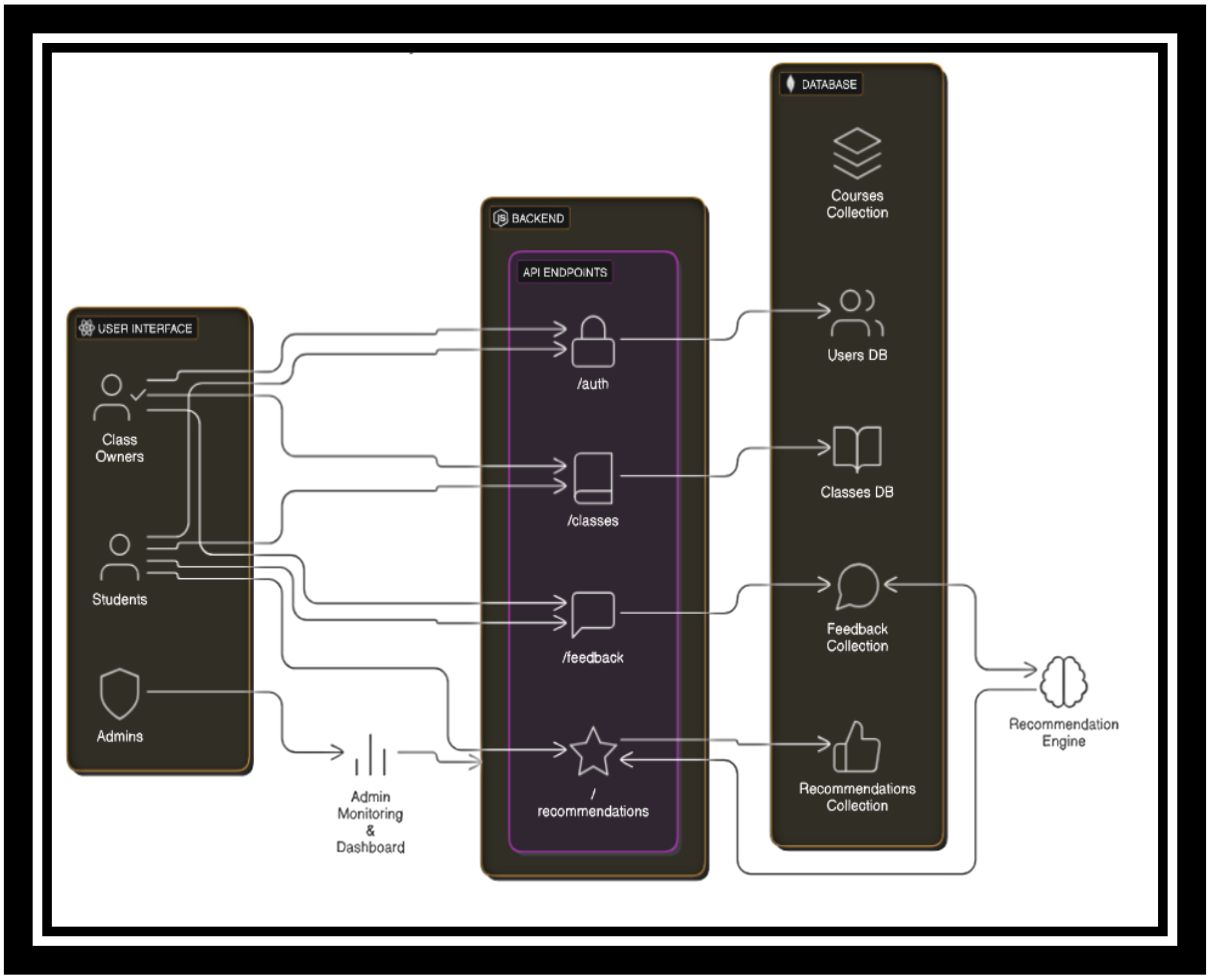
authentication, manage genuinity and log activities for system reliability. This paper emphasizes the use of MERN (Express, MongoDB). React, Node.js, and JS.js) technology stack to create a productive offline class recommendations. The system uses MongoDB for database management, guaranteeing that all job postings, class information, ratings, reviews, and student profiles are safely stored and accessible when needed. Go ahead and express. JSON and Node.js. While React drives the dynamic front-end interface, JavaScript forms the server-side framework, facilitating seamless data transfer between the database and the client interface. Students and class instructors can engage with the system efficiently thanks to the smooth user experience this combination of technologies offers. Because of its real-time updates and capacity to manage large volumes of data interactions, minimizing manual labor, and improving user communication. The platform enables students to enter and edit their personal information, credentials, and abilities. By making course recommendations based on the student's profile, it improves their employability. Students can also review and rate only the classes they are enrolled in. To ensure that they can find qualified candidates quickly, the system makes it simple for instructors to add, edit, or remove course listings. Students look for classes based on their skills, which helps them find authentic classes, get a good learning platform, and save time and money. The admin can easily monitor and manage student details thanks to the portal's comprehensive view of all student profiles.



IV. PROPOSED SYSTEM

This flow diagram outlines the interactions and roles within a class and job recommendation system, highlighting the functions of Users, Admins, and Instructors. Users can register, log in, and update their profiles with newly acquired skills. They can search for available classes and job opportunities, receiving personalized recommendations based on skills and interests through AI techniques like knowledge graphs and NLP. These recommendations provide suggestions for offline classes tailored to the user's skills, as well as job opportunities relevant to their expertise.

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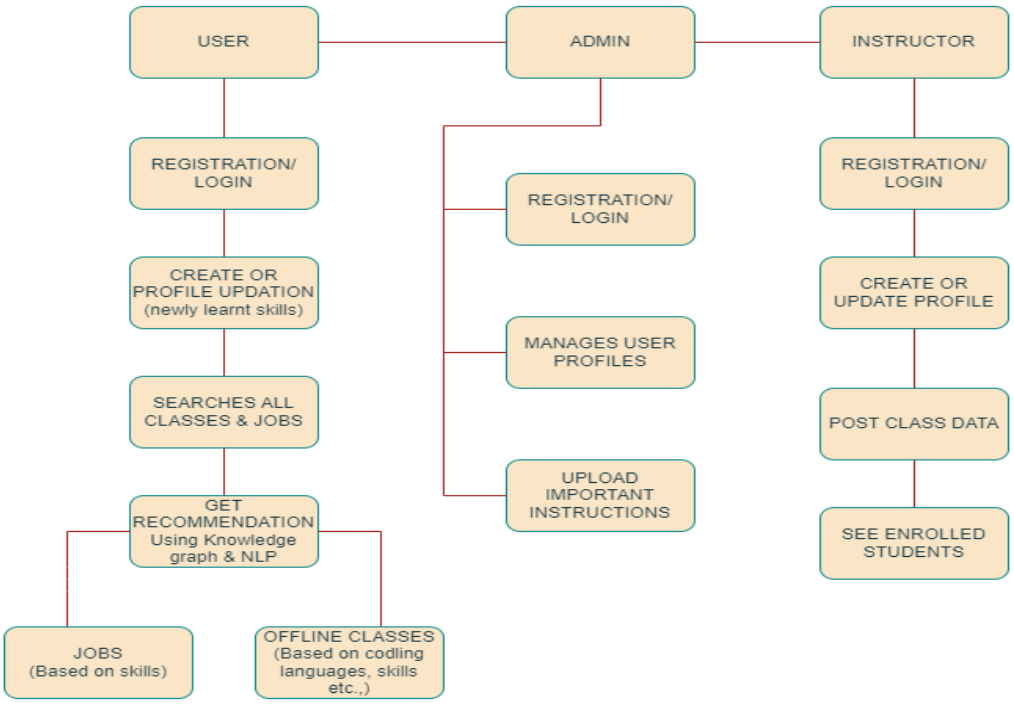
Admins play a central role in managing user profiles, overseeing registration processes, and maintaining the integrity of the platform by uploading important instructions that guide user interactions. This ensures a smooth user experience and reliable management of data and profiles.

Instructors are responsible for registering and logging in to the system, where they can create or update their profiles. They post details about available classes and have access to view enrolled students, facilitating communication and effective management of class data. This structured flow allows seamless interactions among users, admins, and instructors, supporting personalized recommendations and efficient class and job management within the platform.



V. EXPECTED RESULTS

This paper emphasizes the use of MERN (Express, MongoDB). React, Node.js, and JS.js) technology stack to create a productive offline system for hiring and class recommendations. The system uses MongoDB for database management, guaranteeing that all job postings, class information, ratings, reviews, and student profiles are safely stored and accessible when needed. Go ahead and express. JSON and Node.js. While React drives the dynamic front-end interface, JavaScript forms the server-side framework, facilitating seamless data transfer between the database and the client interface. Students and teachers can engage with the system efficiently thanks to the smooth user experience this combination of technologies offers. Because of its real-time updates and capacity to manage large volumes of data interactions, the MERN stack is perfect for handling intricate placement operations, minimizing manual labor, and improving user communication. The platform enables students to enter and edit their personal information, credentials, and abilities. By making course recommendations based on the student's profile, it improves their employability. Students can also review and rate only the classes they are enrolled in. To ensure that they can find qualified candidates quickly, the system makes it simple for instructors to add, edit, or remove course listings. Students look for classes based on their skills, which helps them find authentic classes, get a good learning platform, and save time and money. The admin can easily monitor and manage student details thanks to the portal's comprehensive view of all student profiles.

VI. CONCLUSION

This paper aims to provide a structured solution to the challenges faced in navigating offline classes and campus job opportunities. By developing an integrated class and job recommendation system, the proposed approach harnesses machine learning techniques—such as knowledge graphs, NLP, and decision trees to deliver tailored recommendations that consider students' skills, interests, and geographical preferences. The

dual focus on course and job recommendations creates a unified, user-centric platform that simplifies career-related decision-making for students. The system's capacity to verify ratings and reviews also addresses a critical gap in trust and transparency within the recommendation ecosystem. Through this innovative approach, the system not only enhances the efficiency and accuracy of recommendations but also contributes to students' educational and career advancement. Future enhancements could include expanding to broader regional preferences and integrating advanced analytics to refine recommendations further, thereby positioning this system as a valuable resource for academic and professional growth.

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