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AI-Powered Recommendation System for Personalized Course and Mentor Selection

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Abstract

Online courses have revolutionized the education landscape, providing students with the flexibility to learn at their own pace and access a wide range of topics from anywhere in the world. However, traditional online course and mentor recommendation systems face several challenges. These systems typically rely on basic factors such as course descriptions, ratings, and reviews, but fail to offer personalized or contextually relevant suggestions. As a result, students may find it difficult to navigate through a plethora of courses, and mentors, who are crucial to a student's learning journey, are often not appropriately matched. This leads to inefficiencies in the course selection process and poor student engagement due to irrelevant or generic recommendations. To overcome these issues, this project proposes an innovative recommendation system for both online courses and mentors, incorporating Natural Language Processing (NLP) and deep learning techniques, particularly Lexicon-Enhanced Long ShortTerm Memory (LSTM). The system is designed to analyze large datasets of course and mentor reviews, as well as course content, to provide more accurate, personalized recommendations. By applying sentiment analysis, the system processes nuanced feedback from students to identify specific course attributes and mentor qualities that align with a learner's needs, preferences, and academic goals. This not only enhances the matching process for courses but also recommends mentors whose expertise and teaching styles complement the student's learning preferences. The model considers factors like student goals, learning styles, and past performance to suggest courses and mentors who can provide a tailored educational experience. This personalized approach ensures that students receive relevant course and mentor suggestions, fostering a more effective and satisfying learning experience

Keywords: Description, ratings, reviews, Natural Language Processing (NLP),Long ShortTerm Memory (LSTM)

INTRODUCTION

An online course portal is a web-based platform that provides access to a variety of educational courses and learning materials over the internet. It serves as a virtual learning environment where students can enroll in courses, access course materials, interact with instructors and other students, submit assignments, take quizzes or exams, and track their progress. Online course portals offer a convenient and flexible way for individuals to learn at their own pace and from anywhere with an internet



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connection. They have gained significant popularity in recent years due to their accessibility, affordability, and the wide range of courses available across different subjects and disciplines.

These portals typically host courses from various educational institutions, independent instructors, or online learning platforms. They may offer both free and paid courses, and often include multimedia content such as videos, presentations, and interactive learning materials to enhance the learning experience. The online course portal provides a centralized platform for students to explore different courses, enrol in the ones that interest them, and access the necessary resources to complete the course. It may also include features such as discussion forums, messaging systems, and progress tracking tools to facilitate communication and engagement between students and instructors. Overall, an online course portal offers a convenient and flexible alternative to traditional classroom-based learning, allowing individuals to acquire new skills, pursue personal interests, or enhance their professional development through self-paced online courses.

PROPOSED WORK

The proposed system for the project aims to enhance the recommendation process for online courses and mentors by using advanced techniques like Natural Language Processing (NLP) and deep learning (Lexicon-Enhanced LSTM). It focuses on:

• Personalized Recommendations

The core of the proposed system is to deliver personalized course and mentor suggestions tailored to each student's individual preferences, learning patterns, and academic goals. Unlike traditional systems that make generic recommendations, this approach considers a student's past choices, subject interests, and learning behavior to recommend courses and mentors that are most relevant to their learning journey. This personalized matching ensures higher student engagement and satisfaction.

• Sentiment Analysis

To better understand student experiences and preferences, the system incorporates sentiment analysis techniques. It processes feedback, reviews, and comments from students regarding courses and mentors. By extracting emotional tones—whether positive, negative, or neutral—the system can evaluate the quality of teaching, content delivery, and mentor effectiveness. This helps in recommending courses and mentors that align with students' expectations and learning needs.

• Deep Learning Integration with Lexicon-Enhanced LSTM

The system uses a Lexicon-Enhanced Long Short-Term Memory (LSTM) network, a type of recurrent neural network specifically designed to capture long-term dependencies in textual data. By integrating domain-specific lexicons (dictionaries of sentiment-laden words), the model gains a deeper understanding of the context and sentiment behind student feedback. This enhances the accuracy of recommendation by making more informed decisions based on nuanced expressions, such as sarcasm, enthusiasm, or dissatisfaction.

METHODS

1. Course Portal Web App

This module serves as the central platform for the entire system, developed using Python, Flask, MySQL, Bootstrap, and deployed on WampServer. It provides a responsive and interactive web



interface that integrates various functionalities—from user registration and authentication to course browsing and mentor listings. The backend, built on Flask, efficiently manages data transactions and business logic, while MySQL ensures secure and reliable storage of course details, user profiles, and study materials. Bootstrap is utilized to create an adaptive front-end that maintains consistency and usability across different devices, ensuring that users experience a seamless and intuitive portal.

2. End user

2.1. Web Admin Interface

- Login: Secure access for system administrators.
- User Management: Approve or reject student and faculty registrations.
- Course Category Management: Add, edit, or delete course categories.
- Feedback & Review Monitoring: View and analyze user feedback and reviews.
- Model Training Oversight: Supervise the training and updating of the recommendation model.
- Report Generation: Generate user activity, engagement, and system performance reports.

2.2. Faculty/Staff/Trainer Interface

- Registration & Login: Faculty can securely register and log in.
- **Course Management:** Select relevant course categories and upload study materials (PDFs, videos, documents).
- Student Request Handling: Approve student requests to join specific courses.
- Schedule Management: Set up and manage live class schedules.
- Live Class Hosting: Conduct interactive online classes.
- Feedback Review: Access student feedback for continuous teaching improvement.
- Performance Reports: Analyze course effectiveness and student engagement.

2.3. Student Interface

- **Registration & Login:** Secure access for students to the platform.
- **Personalized Recommendations:** View AI-powered course and mentor suggestions based on learning preferences.
- Course Exploration: Search courses using filters and select top-rated options.
- Enrollment Requests: Send requests to join desired courses.
- Schedule Access: Receive class schedules upon approval.
- Online Classes: Attend scheduled live sessions.
- Payment Gateway: Make secure online payments for enrolled courses.
- Study Material Access: Download course content for offline use.
- **Review System:** Submit trainer/course reviews post-completion for quality improvement.

3. Recommender Model Training

The Model Training module is for developing an effective recommendation system by interpreting user reviews and feedback. It includes various stages to transform raw data into actionable insights for real-time recommendations on the Course Portal Web App.



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- **Reviews Collection:** Gathers course and mentor feedback to build a comprehensive dataset for analysis.
- **Preprocessing:** Cleans and standardizes raw text data using techniques like tokenization, stemming, and stopword removal, making it suitable for machine learning models.
- Sentiment Analysis: Uses LSTM networks for analyzing sentiment in reviews, applying techniques like TF-IDF and Word2Vec for text vectorization, and classifies reviews as positive, neutral, or negative.
- **Feature Extraction:** Extracts meaningful features from sentiment analysis, such as course difficulty, engagement, and mentor expertise, for improved recommendations.
- **Classification & Labeling:** Classifies courses and mentors into categories like "Best" or "Top-Rated" based on review sentiment, engagement, and feedback consistency.
- **Build and Train the Model:** Trains a Lexicon-Enhanced LSTM model on sentiment-labeled data, optimizing it for accurate course and mentor ranking and recommendations.
- **Model Deployment:** Deploys the trained model in the Course Portal Web App, enabling realtime predictions and recommendations based on user feedback, providing personalized course and mentor suggestions.

4. Personalized Recommendation Engine

The Personalized Recommendation Engine enhances the learning experience by providing tailored suggestions based on student needs, preferences, and progress.

- **Course Selection:** Suggests similar courses and the best mentor based on the student's learning progression and preferences.
- Mentor Search: Recommends mentors with expertise in the student's chosen topic, ensuring alignment with their learning needs.
- This system ensures students receive relevant and personalized recommendations, creating a more engaging and effective educational journey.

5. Notification

The Notification module facilitates real-time communication and updates between the system and users (students, faculty, admins) regarding important actions and events on the platform.

- **Real-time Updates:** Notify users about important events such as course approval, mentor recommendations, schedule changes, or new feedback.
- Alerts: Send alerts for payment confirmation, class reminders, review requests, or any updates related to course or mentor activities.
- **Communication Channels:** Use email, SMS, or in-app notifications to keep users informed and engaged with the system



SYSTEM ARCHITECTURE





RESULT

Test Case ID: TC001

- Input: Valid admin login credentials
- Expected Result: Admin dashboard is displayed
- Actual Result: Admin dashboard is displayed
- Status: Pass

Test Case ID: TC002

- Input: Invalid admin login credentials
- Expected Result: Error message: "Invalid credentials"
- Actual Result: Error message is displayed
- Status: Pass

Test Case ID: TC003

- **Input:** Student registers with a unique email
- Expected Result: Registration successful
- Actual Result: Registration successful
- Status: Pass

Test Case ID: TC004

- Input: Student logs in with correct credentials
- Expected Result: Redirected to student dashboard
- Actual Result: Student dashboard displayed
- Status: Pass

Test Case ID: TC005

- Input: Student logs in with incorrect password
- Expected Result: Error: "Incorrect password"
- Actual Result: Error message displayed
- Status: Pass

Test Case ID: TC006

- Input: Faculty uploads valid course PDF
- Expected Result: Course uploaded successfully
- Actual Result: Course uploaded successfully
- Status: Pass

Test Case ID: TC007

- Input: Faculty uploads unsupported file (.exe)
- Expected Result: Error: "Unsupported file format"
- Actual Result: Error displayed
- Status: Pass



Test Case ID: TC008

- Input: Student requests course enrollment
- Expected Result: Enrollment request sent to faculty
- Actual Result: Request sent successfully
- Status: Pass

Test Case ID: TC009

- Input: Faculty approves course enrollment
- Expected Result: Student enrollment confirmed
- Actual Result: Student enrolled successfully
- Status: Pass

Test Case ID: TC010

- **Input:** Admin adds a new course category
- Expected Result: Category added and visible in dropdown
- Actual Result: Category added successfully
- Status: Pass

Test Case ID: TC011

- **Input:** Student submits feedback for a mentor
- Expected Result: Feedback saved and mentor rating updated
- Actual Result: Feedback submitted and rating adjusted
- Status: Pass

Test Case ID: TC012

- Input: Faculty schedules a live class
- Expected Result: Students notified, schedule updated
- Actual Result: Class scheduled and notifications sent
- Status: Pass

Test Case ID: TC013

- Input: Student makes payment using valid details
- Expected Result: Payment processed and confirmation shown
- Actual Result: Payment successful, access granted
- Status: Pass

Test Case ID: TC014

- Input: User tries accessing dashboard without login
- **Expected Result:** Redirected to login page
- Actual Result: Redirected to login
- Status: Pass



Test Case ID: TC015

- Input: Student accesses portal from mobile
- Expected Result: UI adapts to smaller screen size
- Actual Result: Responsive layout works correctly
- Status: Pass





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CONCLUSION

In conclusion, the Course Portal Web App successfully addresses the modern educational need for a personalized, intelligent, and scalable online learning environment. By integrating advanced technologies such as Flask, MySQL, Bootstrap, and machine learning techniques like Lexicon-Enhanced LSTM for sentiment analysis, the platform offers a seamless experience for students, faculty, and administrators alike. The recommendation system ensures that learners are guided toward relevant courses and mentors based on their preferences and feedback, enhancing both engagement and learning outcomes. With features such as real-time notifications, secure user management, live class scheduling, and content delivery, the system streamlines the entire academic process from enrollment to feedback. Overall, the project demonstrates how data-driven insights and AI can transform traditional e-learning into a more effective, interactive, and user-centric experience.

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REFERENCES

- 1. Koren, Y., Bell, R., & Volinsky, C. (2009). Matrix factorization techniques for recommender systems. Computer, 42(8), 30-37.
- 2. Bobadilla, J., Ortega, F., Hernando, A., & Gutiérrez, A. (2013). Recommender systems survey. Knowledge-Based Systems, 46, 109-132.
- 3. Zhang, M. J., Zou, J. H., Li, J., & Chen, K. (2017). An improved collaborative filtering recommendation algorithm based on matrix factorization. EURASIP Journal on Advances in Signal Processing, 2017(1), 42.
- 4. Yang, Z., Yang, D., Dyer, C., He, X., Smola, A., &Hovy, E. (2016). Hierarchical attention networks for document classification. Proceedings of the 2016 Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies, 1480-1489.
- 5. Burke, R. (2002). Hybrid recommender systems: Survey and experiments. User Modeling and User-Adapted Interaction, 12(4), 331-370.
- 6. Li, X., Wang, Y., Zhang, W., & Li, Y. (2018). An improved course recommendation algorithm based on collaborative filtering and deep learning. Applied Sciences, 8(12), 2382.
- 7. Balabanović, M., & Shoham, Y. (1997). Fab: content-based, collaborative recommendation. Communications of the ACM, 40(3), 66-72.