JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY , NOIDA

MAJOR PROJECT

EVEN SEMESTER 2023 - 2024

SYNOPSIS

TOPIC - Building a Learning Management System with Machine Learning Course Recommendation

Submitted By-
Mohammed Fayez Khan - 20102148
Ravi Prakash - 20102134

Submitted to-
Dr. Jasmine Saini
(Project Supervisor)

Department of ECE

Jaypee Institute of Information Technology sector-62 , Noida - UP, India

INTRODUCTION

In the realm of online education, our college project aspires to make a meaningful impact by creating an advanced **Learning Management System (LMS)** equipped with a **machine learning-based course recommendation system.** At its core, our project aims to deliver a tailored learning experience that adapts to each user's unique needs and goals.

Commitment to Modernising Education:

Our project signifies our commitment to modernize virtual education. It acknowledges that traditional educational approaches may not fully cater to individual needs. We aim to redefine how education is delivered and experienced, especially in the digital age.[6]

Personalization and Empowerment:

Central to our project is the idea of personalization. We understand that every learner is unique. Our machine learning-based recommendation system offers personalised course recommendations based on skills, preferences, and aspirations, empowering learners to take control of their educational journey.[6]

Adapting to the Digital Era:

In today's digital world, education should be flexible and accessible. Our project combines technology and education to provide a learning experience that is adaptable and continuous, transcending physical boundaries and rigid schedules.[6]

A Promise of Progress:

Our college project represents a promise of progress in the field of online education. We aim to create a more inclusive, effective, and engaging learning experience. By leveraging technology and educational expertise, we hope to empower learners from diverse backgrounds to achieve their full potential.[6]

In summary, our project seeks to modernize education by offering a personalized learning experience. It reflects our commitment to shaping the future of learning, where each learner can embark on a unique educational journey.

OVERVIEW

Our project is an intersection of modern web development technologies and the cutting-edge capabilities of machine learning. It's about taking the traditional LMS concept and infusing it with AI-powered insights to provide a truly personalized learning journey. Users will discover a comprehensive LMS that doesn't just offer courses but empowers them with intelligent recommendations derived from their skills and preferences.

To bring the power of machine learning into our LMS, we'll deploy a hybrid recommendation system directly into the website's architecture. This model leverages both collaborative and content-based filtering techniques to refine course suggestions. Collaborative filtering draws insights from user behavior and preferences, while content-based filtering considers course attributes. This hybrid approach ensures that our recommendations are not only personalized but also enriched with a deep understanding of both user behavior and course content. This intelligent system will seamlessly integrate into the LMS, continually enhancing the learning experience for our users.

SOFTWARE/STACKS USED :

This endeavor leverages an arsenal of powerful technologies and stacks:

Frontend Excellence*:* We create an engaging and responsive user interface with **Next.js** and **React,** ensuring a smooth and intuitive experience. [2]

Payment Prowess: Stripe, a leader in secure payment processing, handles financial transactions, ensuring users' peace of mind. [2]

Video Virtuosity*:* Mux is our trusted ally, ensuring seamless video content delivery for an immersive learning experience. [2],[5]

Data Dominance: Prisma, paired with **MySQL**, efficiently manages data, forming the foundation of our course management system. [2],[4]

Machine Learning Mastery: The star of the show is our hybrid recommendation system, a fusion of collaborative and content-based filtering, designed to provide users with precisely tailored course suggestions. [1],[3],[4]

OBJECTIVES

Our Learning Management System is more than just a platform; it's an educational ecosystem. Users traverse a user-friendly interface, simplifying navigation, course selection, and secure payment processing through Stripe. However, the true innovation lies in the integration of a machine learning-driven course recommendation system.

DESCRIPTION OF THE PROJECT :

a. **User-Centric Interface:** Our foremost aim is to provide an interface that feels intuitive, responsive, and visually appealing, thereby enhancing user engagement. [2],[3],[4]

b. **Payment Security:** Stripe is meticulously integrated to fortify financial transactions,ensuring the highest levels of security for user data. [2]

c. **Skill Assessment:** We introduce a robust skill-testing examination module to accurately gauge users' competencies. [2],[4]

d. **Recommendation System*:*** The heart of our project, the hybrid recommendation system, combines collaborative filtering, which considers user behavior, and content-based filtering,which considers course attributes, to fine-tune course suggestions. [2],[4],[7]

e. **Seamless Video Delivery**: Mux is seamlessly integrated to facilitate uninterrupted streaming of video content, ensuring a rich and immersive learning experience. [2],[6]

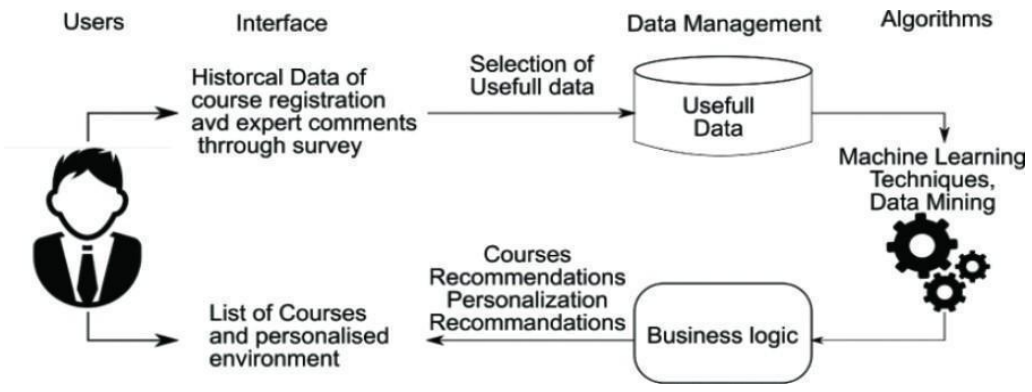

Fig 1: Overview of the implementation of the system

METHODOLOGY

User Registration: The educational journey commences with user registration, during which basic information is collected. [2]

Course Catalog: A comprehensive course catalog empowers users to explore and select courses that align with their interests and aspirations. [2],[6]

Payment Processing: Stripe ensures the secure and efficient handling of payments, ensuring users of the safety of their financial information. [2]

Skill Testing Exam: Users undergo a skill assessment examination, the results of which serves as the cornerstone for generating highly personalized course recommendations. [6]

Recommendation System: The hybrid recommendation system combines collaborative filtering, considering user behavior, and content-based filtering, considering course attributes, to fine-tune course suggestions, resulting in an intelligent and dynamic learning experience. [2],[4],[6]

Video Content Delivery*:* Mux is seamlessly integrated to facilitate uninterrupted streaming of video content, ensuring a rich and immersive learning experience. [2].[5],[6]

WORKFLOW :

8th Semester Plan (Final 8 weeks) :

During the second semester of the project, the primary focus will be on implementing the machine learning-powered recommendation system, and some chunks of the database infrastructure.

Following this, Weeks 9-12 will focus on the critical task of integrating the recommendation system into the LMS website. This phase will involve merging the machine learning model with the existing web infrastructure, ensuring a seamless user experience where course recommendations are effortlessly presented to learners.

Finally, in Weeks 13-16, rigorous testing and refinement of the recommendation system will take place. This iterative process will involve evaluating the system's accuracy, relevance, and scalability, and addressing any issues or bottlenecks that may arise. User feedback will be incorporated to fine-tune the recommendations further, ultimately delivering a powerful and intelligent learning journey within the LMS, enriched with personalized course suggestions.

TILL NOW :

Sure, here's a high-level workflow of each page:

1. **Login Page**: Users enter their credentials and submit the form. If the credentials are correct, the user is logged in and redirected to the main page. If the credentials are incorrect, an error message is displayed.

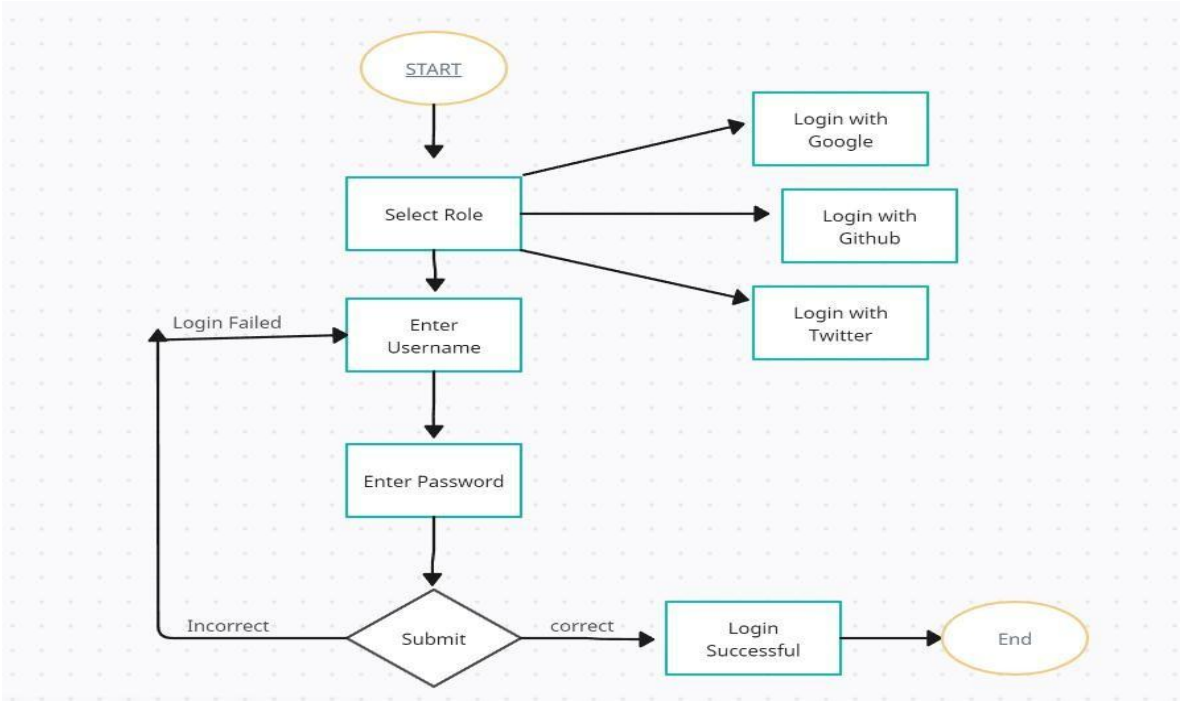

Fig 2 Flow Diagram of Login Authentication Page

2. **Skill Test Page**: Users can take a skill test. Their performance is evaluated by machine learning models and feedback is provided.
3. **Practice Page**: Users can practice their skills interactively. They can choose from various exercises or problems.

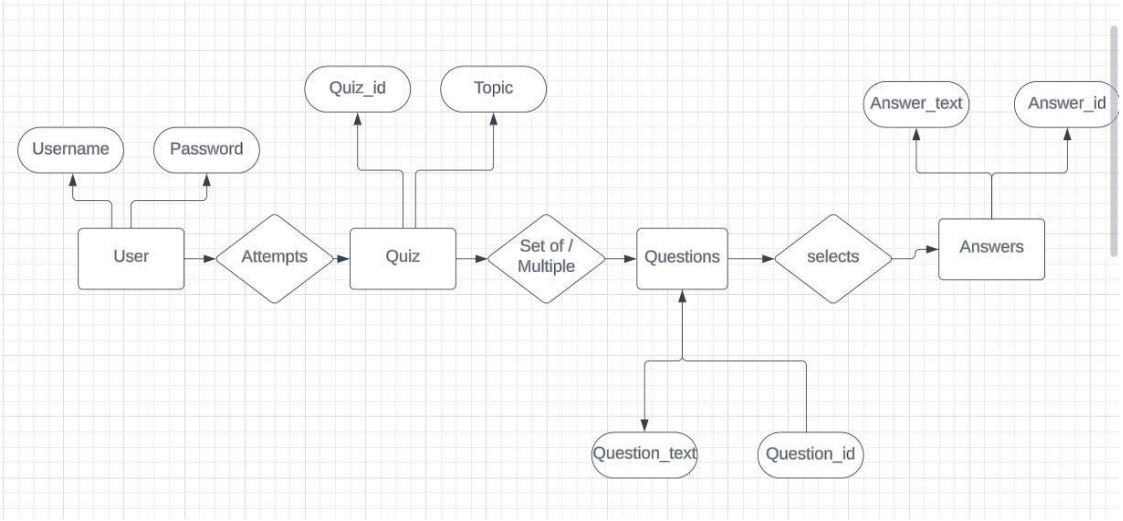

Fig 3 ER Diagram of Practice Page

4. **Course Recommendation Page**: Users receive personalized course recommendations. These recommendations are generated by machine learning models based on the user's profile, interests, and past performance.

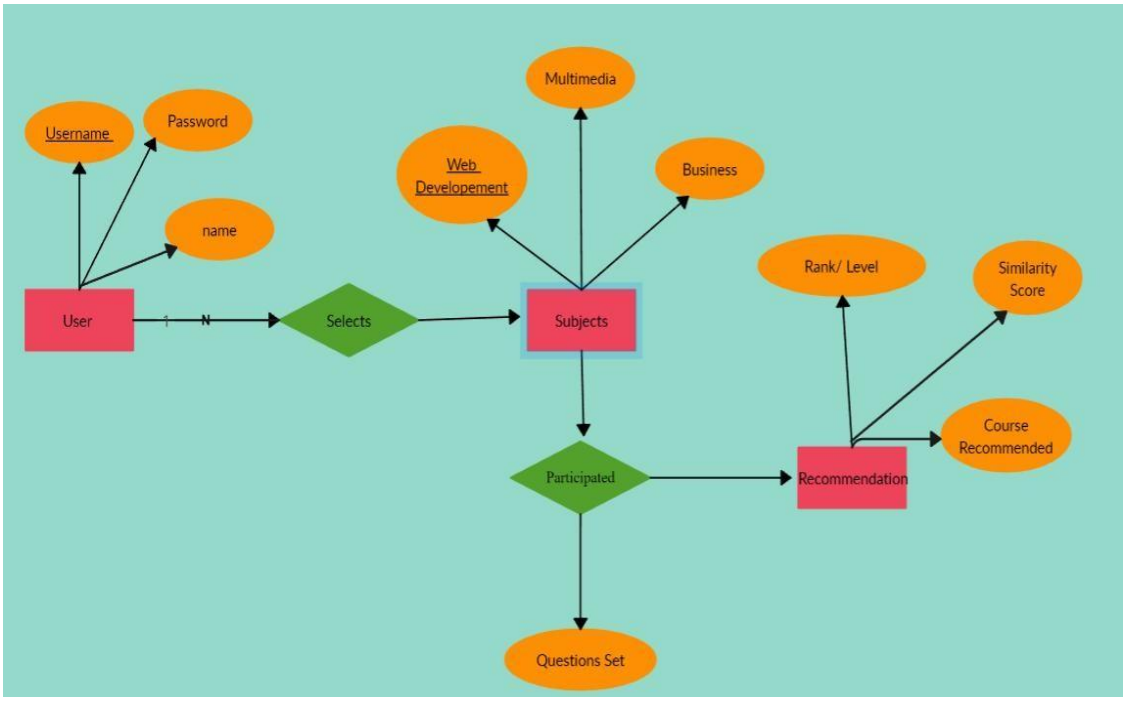

Fig 4 ER Diagram of Course Recommendation system

5. **Books Recommendation Page**: Users receive book recommendations. These recommendations are generated by machine learning models based on the user's profile and interests.

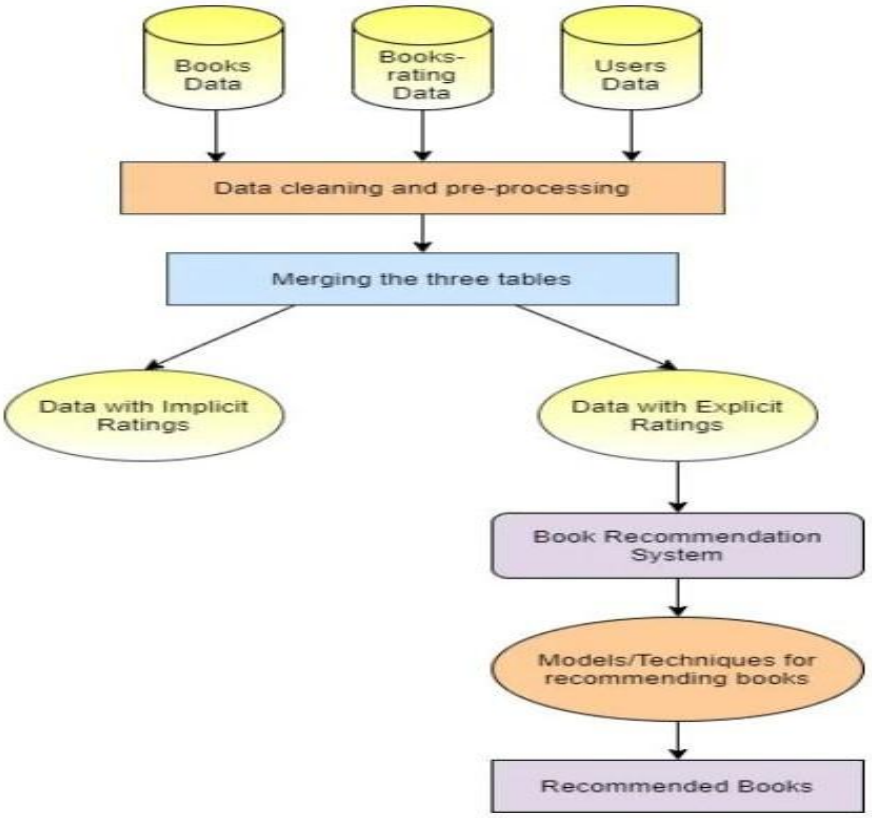

Fig 5 Flow Diagram of Book Recommendation System

6. **Career Path Suggestion Page**: Users receive career path suggestions. These suggestions are generated by machine learning models based on the user's skills and interests.
7. **Counseling Page**: Users can receive guidance and support. They can schedule counselling sessions and communicate with counsellors.
8. **Help Center Page**: Users can access various resources to help them navigate and use the LMS effectively. They can search for help topics, view FAQs, and contact support.

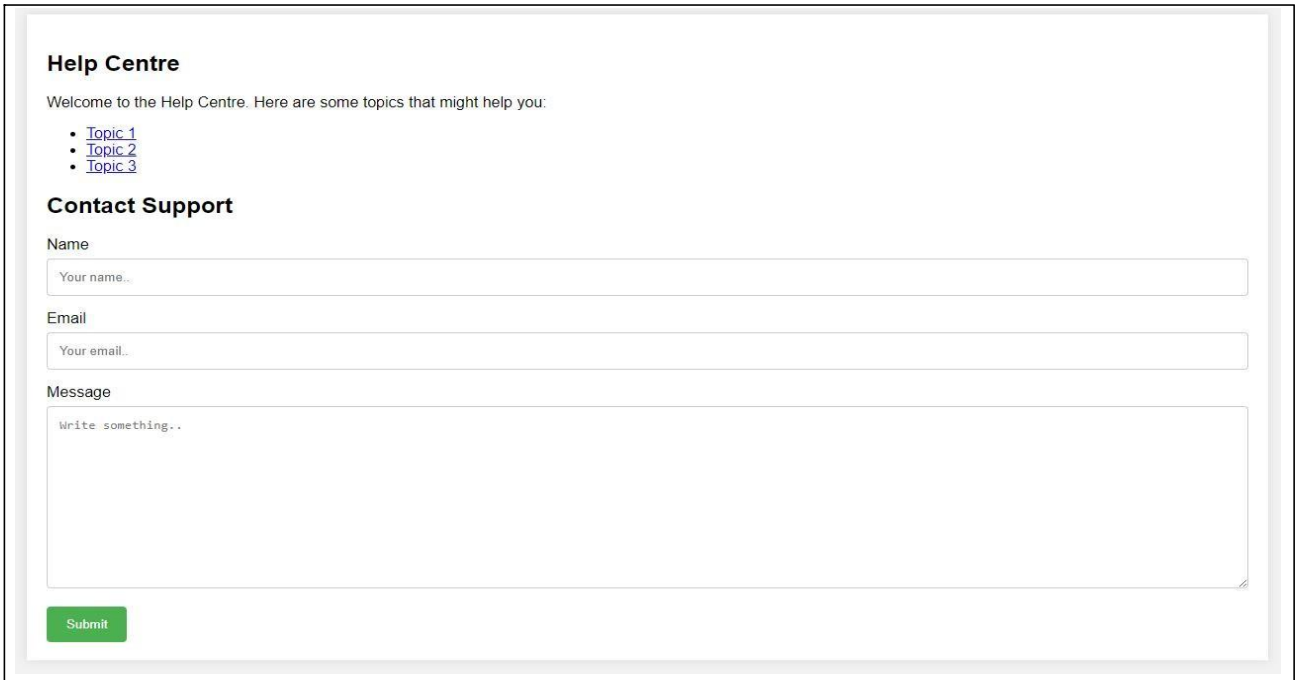

Fig 6 Landing page of Help Centre

9 . **Subscribe Page**: Users can choose to subscribe on a weekly, monthly, or yearly basis at different rates. They can select a subscription plan and submit the payment.

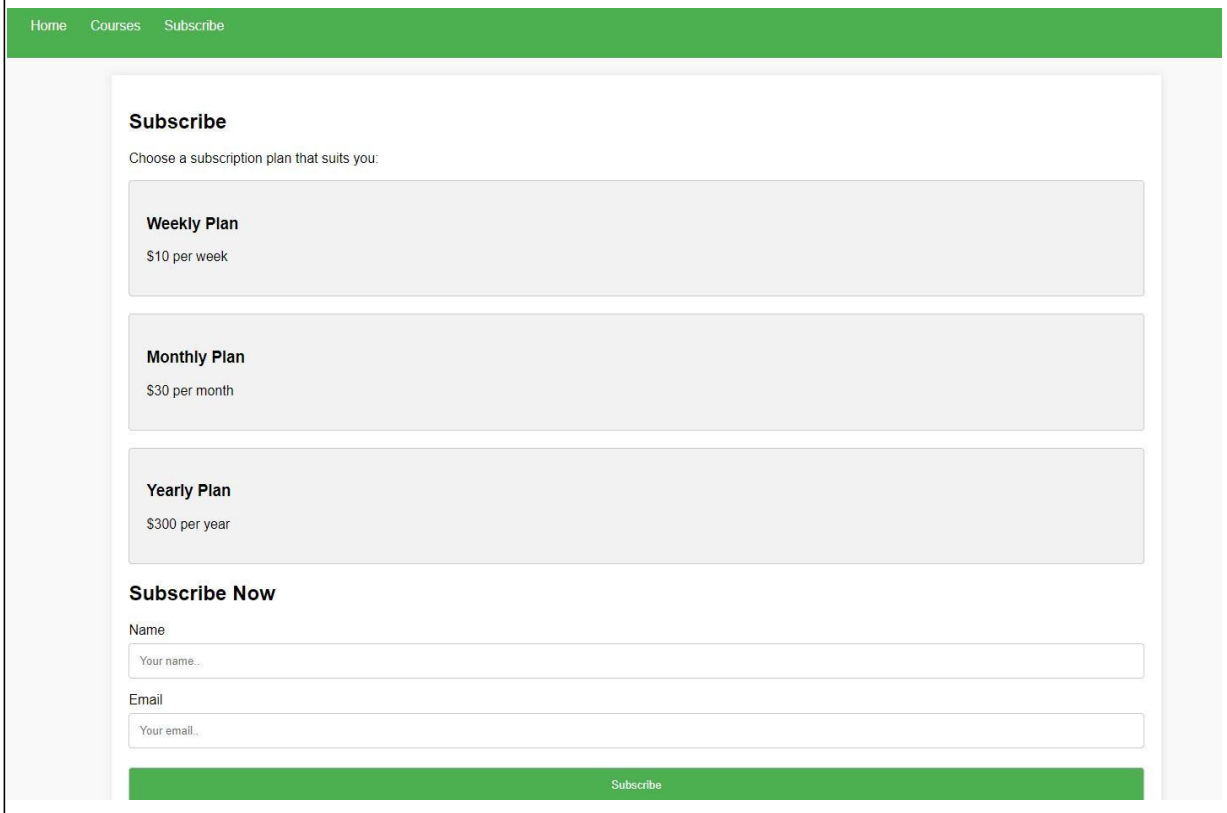

Fig 7 Landing page of Subscribe

10 . **About Us Page**: Users can learn about the organization behind the LMS. They can read about the organization's mission, team, and history.

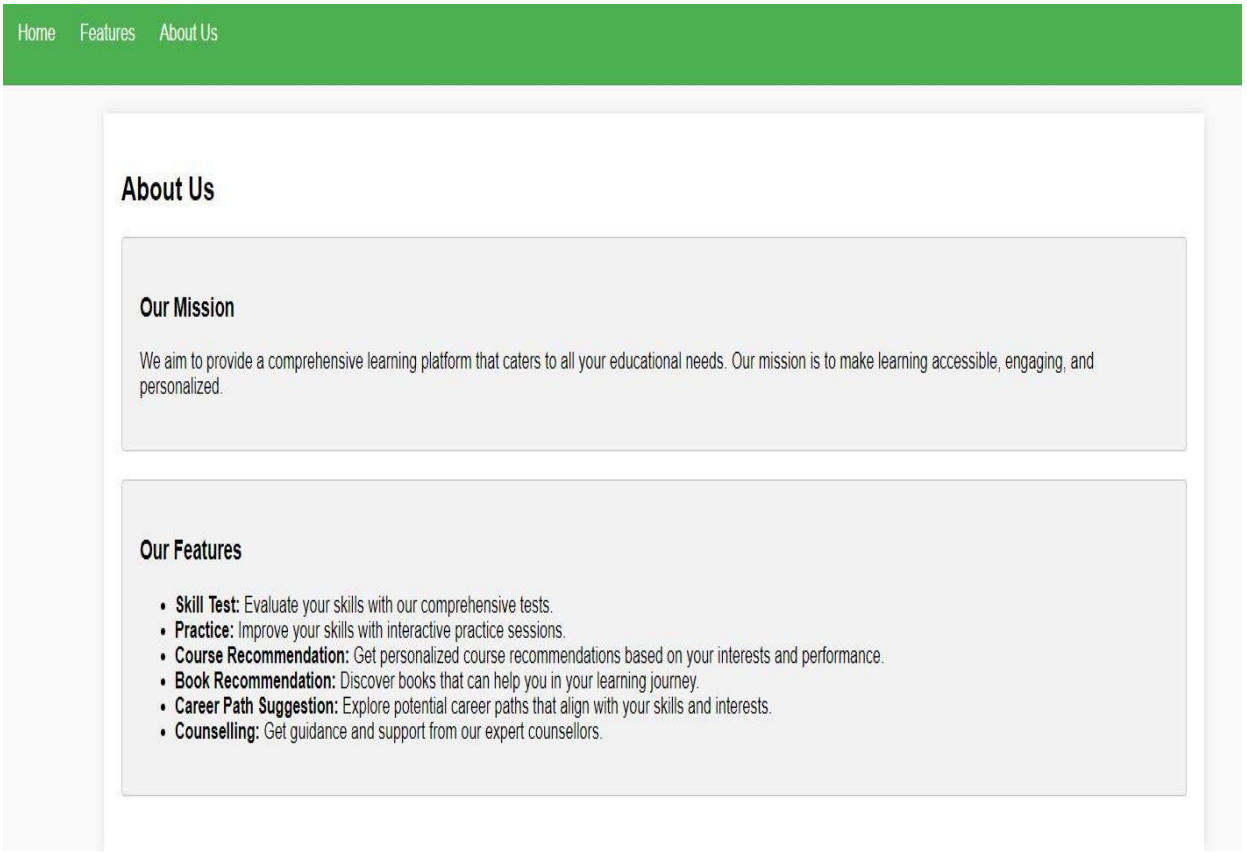

Fig 8 Landing page of AboutUs Page

RESULT

- This ambitious project culminates in an LMS that signifies a pivotal moment in online education. The project's remarkable outcomes include:
- A user-centric interface that simplifies registration, course selection, and enrollment,enhancing overall user satisfaction.
- Robust payment security through Stripe, assuring the protection of sensitive financial information.
- Skill assessment examinations that drive the generation of highly personalized course recommendations, optimizing the learning journey.
- The cutting-edge hybrid recommendation system, a technological marvel, enhancing user engagement and empowerment.
- Flawless video content delivery facilitated by Mux, elevating the quality of the learning experience to unprecedented heights.

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