iJRASET
International Journal For Research in Applied Science and Engineering Technology



# INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

**Volume:** 14 **Issue:** IV **Month of publication:** April 2026

**DOI:** https://doi.org/10.22214/ijraset.2026.80411

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
*ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538*
*Volume 14 Issue IV Apr 2026- Available at www.ijraset.com*

# Alumni Connect: A Smart Bridge Between Students, Alumni and Institute

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***Abstract:*** ***In recent years, maintaining effective communication and collaboration between educational institutions and their alumni has become increasingly important for academic growth and career development. Traditional alumni management systems often fail to provide personalized interactions, intelligent networking, and meaningful engagement opportunities for students and alumni. To address these challenges, this project proposes a Machine Learning–based Alumni Connect Portal that serves as a smart digital platform for connecting students, alumni, and institutions.***

***The Alumni Connect Portal is designed to facilitate mentorship, career guidance, job and internship referrals, event participation, and professional networking. The system utilizes Machine Learning algorithms to analyze user profiles, including academic background, skills, interests, and professional experience, in order to generate accurate and personalized recommendations. These recommendations help students identify suitable alumni mentors and relevant career opportunities, while enabling alumni to engage more effectively with students who align with their expertise.***

***The platform is implemented as a web-based application with dedicated modules for students, alumni, and administrators. The administrator module ensures secure user management, data verification, and system monitoring. The Machine Learning model improves recommendation accuracy over time by learning from user interactions and feedback, thereby enhancing overall system efficiency and user satisfaction.***

***By automating the alumni–student matching process and enabling data-driven decision-making, the proposed system reduces manual effort, increases engagement, and strengthens institutional alumni relations. The Alumni Connect Portal demonstrates how Machine Learning can be effectively applied to educational networking systems to bridge the gap between academia and industry, support career development, and promote long-term professional collaboration.***

***Keywords: Alumni Management System, Machine Learning, Recommendation System, Mentorship Platform, Career Guidance, Web Application, Hybrid Filtering***

## I. INTRODUCTION

Alumni play a significant role in strengthening the academic and professional ecosystem of educational institutions. They act as a bridge between academia and industry by providing mentorship, career guidance, and networking opportunities to current students. However, despite their importance, most institutions lack an efficient and intelligent platform to facilitate structured interaction between students and alumni.

Traditional alumni management systems are primarily designed for maintaining records and broadcasting announcements. These systems lack personalization, intelligent matching, and interactive features, resulting in low engagement levels. Students often struggle to find relevant alumni mentors aligned with their career goals, while alumni face challenges in identifying students who genuinely require guidance. This gap leads to underutilization of alumni expertise and missed opportunities for mentorship and career development.

With advancements in Machine Learning and data analytics, it is now possible to design intelligent systems that analyze user data and provide personalized recommendations. By leveraging these technologies, alumni–student interaction can be transformed into a dynamic and meaningful process.

### *A. Motivation*

The motivation behind this research arises from the limitations of existing alumni systems, which fail to provide personalized and effective engagement between students and alumni. In today's competitive job market, students require more than academic knowledge; they need mentorship, industry exposure, and professional networking opportunities to succeed.

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Alumni possess valuable real-world experience and insights that can significantly help students in shaping their careers. However, due to the absence of a structured and intelligent platform, this knowledge transfer remains limited. Informal communication channels such as social media are unorganized and unreliable, lacking verification and relevance.

This motivates the development of a Machine Learning-based Alumni Connect Portal that can intelligently match students with suitable alumni mentors, automate interaction processes, and enhance engagement through data-driven recommendations.

Aim: - To develop a Machine Learning-based Alumni Connect Portal for improving interaction and mentorship between students and alumni.

### *B. Problem Statement*

In the current educational ecosystem, alumni represent a valuable resource for mentorship, career guidance, and industry exposure. However, most institutions lack a structured and intelligent platform to effectively connect students with alumni. Existing alumni management systems primarily function as static databases, focusing only on storing basic information such as contact details and academic records, without enabling meaningful interaction.

Students often face difficulty in identifying alumni who align with their skills, interests, and career aspirations. At the same time, alumni who are willing to guide students are unable to efficiently find suitable candidates. This mismatch leads to reduced engagement, ineffective mentorship, and missed opportunities for professional growth.

Additionally, current systems rely heavily on manual processes and informal communication channels such as social media, which lack verification, personalization, and institutional control. The absence of Machine Learning techniques further limits the ability to generate intelligent recommendations and utilize available data effectively.

Therefore, the problem lies in the lack of a centralized, intelligent, and automated alumni management system that can facilitate personalized alumni–student interaction, improve engagement, and support data-driven decision-making

### *C. Objectives*

The main objective of this research is to develop a Machine Learning-based Alumni Connect Portal that enhances interaction and collaboration between students, alumni, and institutions.

The specific objectives are as follows:

- To design and develop a centralized web-based platform for alumni and student interaction.
- To implement a Machine Learning-based recommendation system for personalized alumni–student matching.
- To facilitate structured mentorship and career guidance for students.
- To provide a platform for alumni to share job and internship opportunities.
- To improve student employability through access to professional networks and industry insights.
- To enhance alumni engagement and participation in institutional activities.
- To automate administrative processes such as alumni verification and data management.
- To generate analytical insights for monitoring engagement and improving institutional decision-making.
- To ensure data security and privacy through role-based access control.

### *D. Scope of the Project*

The scope of this research includes the design, development, and implementation of a web-based Alumni Connect Portal integrated with Machine Learning techniques for intelligent recommendation and engagement.

The system is designed to support three primary user roles: students, alumni, and administrators. Students can create profiles, receive personalized alumni recommendations, and request mentorship. Alumni can register, provide mentorship, and share job or internship opportunities. Administrators can manage users, verify alumni credentials, and monitor system activities.

A key aspect of the system is the integration of a Machine Learning-based recommendation engine that analyzes user data such as skills, interests, academic background, and interaction history to generate personalized suggestions. The system also includes features for mentorship management, opportunity sharing, event notifications, and feedback collection.

The project is limited to a web-based platform and focuses on core functionalities such as recommendation, interaction, and data management. Advanced features such as mobile applications, real-time communication, and predictive analytics are considered as future enhancements.

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## II. LITERATURE REVIEW

Alumni management systems and recommendation technologies have gained significant attention in recent years, especially with the growth of web-based platforms and Machine Learning. This section reviews important research contributions related to alumni systems and intelligent recommendation techniques.

According to S. Kumar and R. Yadav [1], effective database design is essential for developing scalable web-based applications. Their study emphasizes structured data storage and efficient retrieval techniques. However, their work focuses mainly on database architecture and does not address intelligent interaction or recommendation mechanisms.

Similarly, R. Sharma and P. Verma [2] proposed a web-based alumni management system that allows institutions to maintain alumni records and share updates. While their system improves communication, it lacks personalization and intelligent matching, which limits user engagement and effectiveness.

Recommender systems form the backbone of intelligent platforms. Francesco Ricci, Lior Rokach, and Bracha Shapira [3] explain how recommendation systems analyze user data to provide personalized suggestions. Their work highlights the importance of user behavior and data-driven decision-making in improving system effectiveness.

Similarly, Charu C. Aggarwal [4] discusses different recommendation techniques such as content-based filtering and collaborative filtering. He emphasizes that hybrid models, which combine multiple approaches, can improve accuracy and overcome issues like data sparsity and cold-start problems.

A comprehensive survey by Gediminas Adomavicius and Alexander Tuzhilin [5] highlights the evolution of recommender systems and identifies the need for more adaptive and intelligent models. Their work shows that traditional systems lack the ability to learn from user interactions effectively.

Further research by Robin Burke [6] focuses on hybrid recommender systems, demonstrating how combining different techniques leads to better performance and more reliable recommendations. This approach is highly relevant for systems requiring personalized matching, such as alumni–student networking.

In recent years, deep learning techniques have been applied to recommendation systems. Shuai Zhang and co-authors [7] discuss how deep learning improves recommendation accuracy by capturing complex patterns in large datasets. This advancement opens new possibilities for intelligent educational platforms.

The theoretical foundation of Machine Learning was established by Tom M. Mitchell [8], who defined learning algorithms and their applications. Building on this, Ian Goodfellow, Yoshua Bengio, and Aaron Courville [9] introduced deep learning models capable of handling complex and large-scale data, which are useful for modern recommendation systems.

From an educational systems perspective, N. K. Jain and A. Gupta [10] discussed the design of web-based information systems for higher education. Their work highlights the importance of structured digital platforms but does not incorporate intelligent recommendation features.

Additionally, M. Kaur and S. Singh [11] emphasized the role of alumni networks in improving student employability. Their study shows that alumni engagement significantly benefits students, but the lack of proper platforms limits its effectiveness.

Early work by Paul Resnick and Hal R. Varian [12] introduced the concept of recommender systems, laying the foundation for modern personalized systems used across various domains.

### *A. Comparison of Literature Surveys*

| Ref No. | Author(s) | Approach | Key Features | Limitations |
|---|---|---|---|---|
| [1] | S. Kumar, R. Yadav | DB Design for Web Apps | Structured storage, efficient retrieval | No intelligent interaction or recommendation |
| [2] | R. Sharma, P. Verma | Alumni Management System | Data handling, communication | No personalization or ML matching |
| [3] | F. Ricci et al. | Recommender Framework | Personalized suggestions using user data | Not applied to alumni systems |
| [4] | C. C. Aggarwal | Recommendation Methods | Content & collaborative filtering | Limited use in real alumni platforms |
| [5] | G. Adomavicius et al. | Recommender Survey | Advanced, adaptive models | Not implemented in education systems |

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| | | | | |
|---|---|---|---|---|
| [6] | R. Burke | Hybrid Recommender | Improved accuracy using hybrid approach | No alumni–student focus |
| [7] | S. Zhang et al. | Deep Learning RS | High accuracy, pattern recognition | Complex, not used in alumni networking |
| [8] | T. Mitchell | ML Concepts | Basic learning algorithms | Only theoretical |
| [9] | I. Goodfellow et al. | Deep Learning | Handles large-scale complex data | High computational cost |
| [10] | N. K. Jain, A. Gupta | Edu Web Systems | Digital institutional platforms | No recommendation features |
| [11] | M. Kaur,S.Singh | Alumni Study | Improves employability | No system/platform design |
| [12] | P. Resnick, H. Varian | Early RS | Foundation of recommender systems | Basic, lacks modern ML |

## III. PROPOSED WORK

### A. *System Analysis*

System analysis is a critical phase in system development that involves understanding the current system, identifying its limitations, and proposing an improved solution. It provides a clear foundation for designing a system that meets user requirements effectively.

In the context of the Alumni Connect Portal, system analysis focuses on evaluating existing alumni management practices and identifying the gaps that hinder efficient interaction between students and alumni. Based on this analysis, a new intelligent and scalable system is proposed to enhance engagement, automation, and decision-making.

#### *1) Existing System Analysis*

Current alumni management systems used by educational institutions are largely conventional and limited in functionality, focusing mainly on data storage and basic communication. Although these systems have transitioned from manual records to digital platforms, they still lack innovation in terms of intelligence, automation, and user engagement.

Typically, alumni information is maintained in spreadsheets, local databases, or simple web portals, where only basic attributes such as name, department, graduation year, and contact details are recorded. These systems provide minimal interaction capabilities and are primarily used for broadcast communication, including event notifications, newsletters, and announcements. There is little to no provision for interactive or collaborative engagement between alumni and students.

One of the most critical limitations of existing systems is the absence of a structured mentorship mechanism. Students often depend on informal sources such as faculty references or social media platforms to connect with alumni. This approach lacks reliability, efficiency, and authenticity, as there is no centralized or verified platform for such interactions.

Furthermore, current systems fail to utilize the available data effectively. There is no implementation of data analytics or Machine Learning techniques to analyze user behavior, preferences, or career trajectories. As a result, these platforms are unable to provide personalized recommendations, leading to underutilization of alumni knowledge and missed opportunities for career guidance, internships, and professional networking.From an administrative standpoint, these systems are labor-intensive and inefficient. Tasks such as alumni verification, data updating, and engagement tracking are performed manually, increasing the chances of errors, redundancy, and outdated information. Additionally, the lack of analytical tools prevents institutions from assessing the effectiveness of alumni engagement initiatives.

Security is another concern, especially when third-party platforms are used. Institutions often have limited control over data privacy, access permissions, and compliance, which may lead to potential risks.

In summary, existing alumni systems are static, non-intelligent, and fragmented, making them inadequate for supporting modern requirements of personalized, scalable, and data-driven engagement.

#### *2) Proposed System Overview*

To overcome the limitations of traditional systems, the proposed Alumni Connect Portal introduces a centralized, intelligent, and interactive platform that enhances collaboration between students, alumni, and institutions.

The core innovation of the proposed system lies in its Machine Learning–based recommenda- -tion engine, which enables intelligent matchmaking between users.

The system analyzes various parameters such as academic background, skill sets, career interests, professional experience, and previous interactions. Based on this analysis, it generates highly relevant and personalized recommendations for mentorship, job opportunities, and professional networking.

The system is designed using a role-based architecture, ensuring clear separation of functionalities and improved system management:

- Student Module: Allows students to build comprehensive profiles, define career goals, explore opportunities, and receive personalized alumni recommendations.
- Alumni Module: Enables alumni to register, verify their identity, share professional experiences, offer mentorship, and contribute job or internship opportunities.
- Admin Module: Provides administrative control for managing users, verifying alumni authenticity, monitoring system activity, and generating analytical reports.

The system emphasizes automation and efficiency, reducing the need for manual intervention in tasks such as verification, matching, and communication. It also incorporates analytics features that provide insights into user engagement, mentorship success rates, and overall system performance.

Security and privacy are ensured through secure authentication mechanisms, role-based access control, and data protection techniques. The system is also designed with scalability in mind, allowing future enhancements such as mobile integration, real-time communication, and advanced AI capabilities. Overall, the proposed system transforms alumni management into a dynamic, intelligent, and user-centric platform, fostering stronger relationships and improving career outcomes for students.

### *3) Functional Requirements*

Functional requirements define the essential features and services provided by the system.

- User Registration and Authentication: - The system shall support role-based registration for Students, Alumni, and Administrators. Secure authentication mechanisms shall ensure that only authorized users can access the system. Alumni accounts shall undergo a verification process before activation.
- Profile Management: - Users shall be able to create, update, and manage detailed profiles. Student profiles include academic details, skills, and career goals, while alumni profiles include professional experience, industry domain, and mentorship availability.
- Alumni Verification: - The system shall include an administrative verification process to ensure the authenticity of alumni users. Only verified alumni shall be allowed to interact within the platform.
- Recommendation System: - The system shall implement a Machine Learning based recomm--endation engine that provides:
  - Mentor suggestions for students
  - Job and internship recommendations
  - Relevant events and networking opportunities
- Mentorship Interaction: - Students shall be able to send mentorship requests to alumni. Alumni can accept, reject, or schedule interactions. The system shall support secure communication channels.
- Opportunity Management: - Alumni shall be able to post job openings and internships. Students can search, filter, and apply for these opportunities.
- Event Management: - Administrators shall create and manage events, workshops, and annou--ncements. Users shall receive notifications based on relevance.
- Feedback System: - Users shall provide feedback on mentorship interactions. This data shall be used to improve recommendation accuracy.
- Reporting and Analytics: - The system shall generate reports on user engagement, mentorship activities, and platform performance for administrative decision-making.

### *4) Feasibility Study*

A feasibility study evaluates whether the proposed system is practical and achievable within given constraints.

- Technical Feasibility: - The system is technically feasible as it utilizes widely available technologies such as web development frameworks and Machine Learning libraries. The recommendation system can be implemented using standard algorithms without requiring high-end infrastructure.

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- Economic Feasibility: - The system is cost-effective due to the use of open-source tools and technologies. Development and operational costs are minimal compared to the long-term benefits such as automation, improved engagement, and enhanced institutional reputation.
- Operational Feasibility: - The system is user-friendly and aligns well with institutional processes. Minimal training is required, and users are likely to adopt the system due to its practical benefits.

*B. System design*

System design defines how the proposed system is structured and how different components interact with each other. It translates system requirements into a detailed blueprint that guides implementation. This chapter explains the architectural design of the Machine Learning–based Alumni Connect Portal and describes the flow of data within the system using Data Flow Diagrams.

*1) Overall System Architecture*

The overall system architecture of the proposed Alumni Connect Portal is designed using a modular, layered, and client–server approach to ensure high scalability, maintainability, security, and efficient performance. The architecture integrates a web-based application framework with a Machine Learning–based recommendation engine, enabling intelligent interaction between students and alumni.

The system is structured into multiple layers, where each layer is responsible for a specific set of functionalities. This separation of concerns ensures that changes in one layer do not affect other layers, thereby improving system flexibility and maintainability.

Architectural Components: -

The system architecture consists of the following major components:

*a) Presentation Layer (User Interface Layer)*

The presentation layer represents the front-end interface of the system and acts as the primary point of interaction between users and the system. It is developed using HTML, CSS, and JavaScript, ensuring a responsive and user-friendly design.

This layer provides role-based interfaces for different types of users, including:

- Students
- Alumni
- Administrators

Through this interface, users can perform various operations such as:

- User registration and login
- Profile creation and management
- Sending and receiving mentorship requests
- Posting and viewing job opportunities
- Accessing personalized recommendations

The presentation layer communicates with the backend (application layer) through secure HTTP requests (APIs), ensuring safe and efficient data exchange.

*b) Application Layer (Business Logic Layer)*

The application layer is the core processing unit of the system, responsible for handling all business logic and system operations. It is implemented using Python with the Flask framework, which provides a lightweight and efficient backend environment.

This layer performs the following major functions:

- User authentication and role-based authorization
- Profile creation, updating, and management
- Processing mentorship requests and responses
- Managing job postings and applications
- Handling event notifications and system updates

The application layer acts as an intermediate bridge between the presentation layer and the data layer. It processes incoming requests, applies business rules, and sends appropriate responses back to the user interface.

*c) Machine Learning Recommendation Engine*

The Machine Learning module is a core component of the system that enhances its intelligence and usability. This module is responsible for generating personalized recommendations based on user data.

The recommendation engine analyzes multiple attributes, including:

- User skills and competencies
- Academic background
- Career interests and goals
- Professional experience
- Previous interactions and feedback

Based on this analysis, the system generates:

- Suitable alumni mentor suggestions for students
- Relevant job and internship opportunities
- Recommended events and networking activities

The Machine Learning model continuously improves its performance by learning from user interactions and feedback, thereby increasing the accuracy and relevance of recommendations over time.

*d) Data Layer (Database Layer)*

The data layer is responsible for the secure storage, retrieval, and management of system data. It is implemented using a MySQL relational database, which ensures structured data organization and integrity.

The database stores various types of information, including:

- User profiles (students, alumni, administrators)
- Skills, interests, and academic details
- Mentorship requests and communication records
- Job postings and application data
- Feedback and engagement history

The relational structure of MySQL ensures data consistency, normalization, and efficient query processing, which is essential for system performance and reliability.

*e) Admin Control and Analytics Module*

The Admin module plays a crucial role in system monitoring, control, and maintenance. It provides administrators with tools to manage and oversee the entire platform.

Key functionalities of this module include:

- Verification and validation of alumni profiles
- Monitoring user activities and interactions
- Managing system content such as events and announcements
- Generating analytical reports on user engagement and system performance
- Maintaining overall system integrity and security

This module helps institutions make data-driven decisions and ensures smooth operation of the system.

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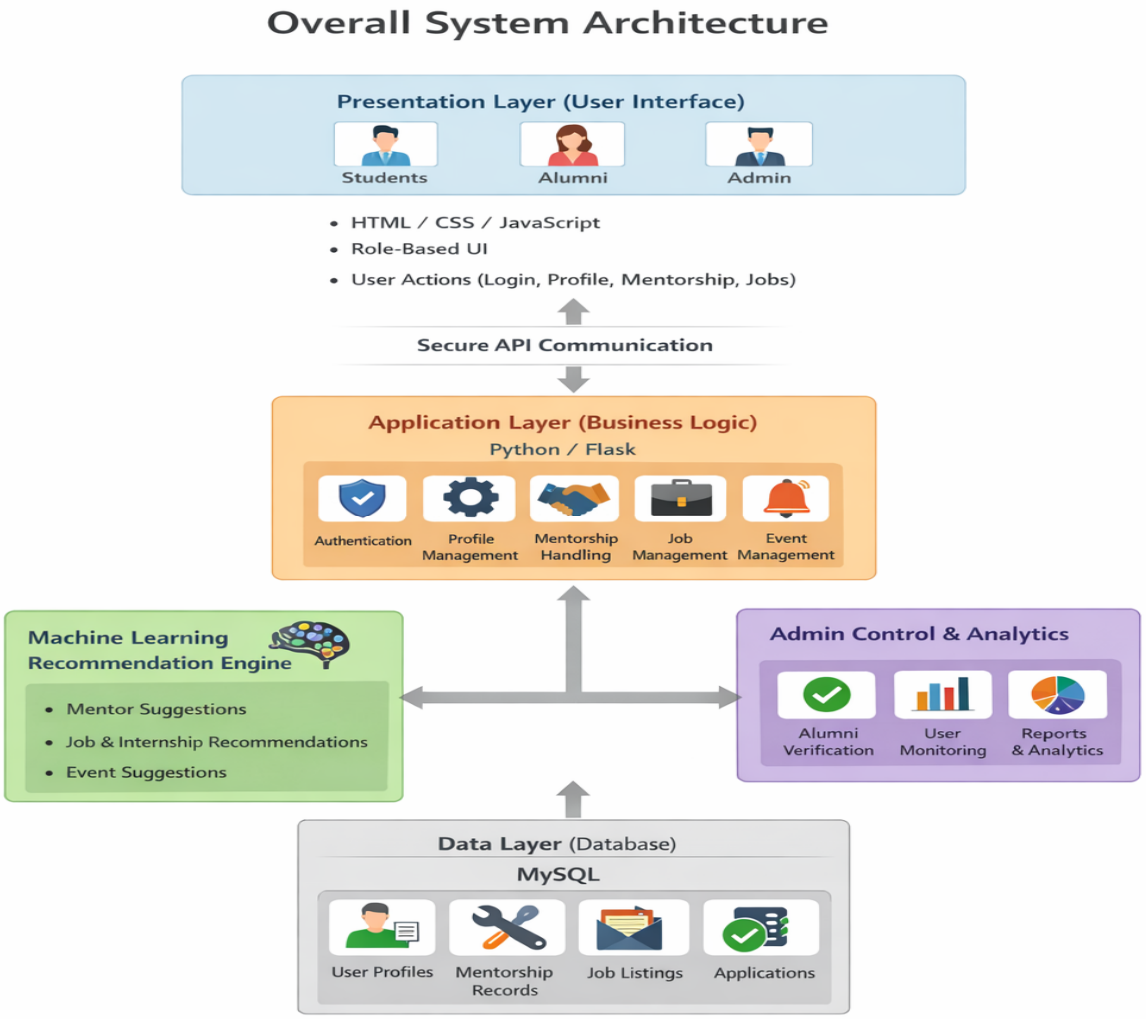



Figure 3.1: Overall System Architecture of Alumni Connect Portal

*2) Machine Learning Model Design*

This chapter presents the design and implementation of the Machine Learning (ML) model integrated into the Alumni Connect Portal. The primary objective of this model is to generate personalized and intelligent recommendations that enhance interaction between students and alumni. These recommendations include mentorship matching, job and internship suggestions, and relevant event notifications.

The ML model is developed using a structured pipeline consisting of data collection, preprocessing, feature selection, model building, training, testing, and evaluation. The system continuously learns from user interactions, ensuring adaptive and improved performance over time.

*a) Data Collection and Preprocessing*

- Data Collection: - The effectiveness of the Machine Learning model is directly influenced by the quality and comprehensiveness of the data used. In the Alumni Connect Portal, data is collected dynamically from various system components to ensure real-time adaptability.

The major categories of data include:

- Student Data:This includes academic qualifications, department, skill sets, areas of interest, career goals, preferred domains, and historical interaction data such as mentorship requests and feedback.
- Alumni Data: This consists of educational background, professional experience, current job roles, industry domains, skill sets, mentorship preferences, availability status, and interaction records.

- Interaction Data: These captures system-level interactions such as mentorship request history, acceptance or rejection patterns, communication frequency, feedback ratings, and duration of engagement between users.
- Opportunity Data:This includes job and internship postings with attributes such as required skills, eligibility criteria, domain specifications, and application outcomes.

All collected data is stored in a structured format within the database and is continuously updated as users interact with the system. This dynamic nature of data enables the ML model to learn evolving patterns.

*b) Data Preprocessing*

The raw data collected from different sources may contain inconsistencies, missing values, and noise. Therefore, preprocessing is performed to convert raw data into a structured and usable format.

The preprocessing steps include:

- Data Cleaning: Removal of duplicate entries, handling of missing values using appropri--ate techniques, and correction of inconsistent or invalid data records.
- Data Normalization and Standardization: Numerical attributes such as years of experience and skill proficiency levels are scaled to a standard range to ensure uniformity during model training.
- Categorical Data Encoding:Categorical attributes such as department, industry domain, and skills are transformed into numerical representations using encoding techniques like label encoding or one-hot encoding.
- Text Data Processing:Textual fields such as skills and interests are processed using tokenization and vectorization techniques to extract meaningful features for model input.
- Data Integration:Data from multiple tables, including student profiles, alumni profiles, and interaction logs, is combined into a unified dataset for effective model training.

These preprocessing steps ensure improved **data quality, consistency, and reliability**, which are essential for accurate predictions.

*c) Feature Engineering*

In addition to the selected features, new attributes are derived to improve the predictive capability of the model:

- Skill Similarity Score:Measures the overlap between student and alumni skill sets.
- Domain Relevance Score:Evaluates the alignment between student career interests and alumni industry domain.
- Engagement Score: Represents the level of interaction between users based on past activities.
- Mentorship Compatibility Index: A combined metric that reflects overall suitability between a student and an alumni mentor.

These engineered features provide deeper insights and improve the quality of recommendations generated by the system.

*d) Machine Learning Algorithms Used*

The Alumni Connect Portal employs multiple Machine Learning techniques to implement a robust recommendation system.

- Content-Based Filtering: Content-based filtering recommends alumni mentors by analyzing the similarity between student and alumni profiles. The similarity is computed using attributes such as skills, interests, academic background, and industry domain. Each user is matched with profiles that closely align with their preferences and characteristics.
- Collaborative Filtering: Collaborative filtering is based on user interaction patterns. It identif-ies similarities among users and recommends alumni mentors based on the preferences and connections of similar users. This method leverages historical data such as mentorship requests and feedback to identify patterns.
- Hybrid Recommendation Model: To improve the overall performance of recommendation system, a hybrid approach is adopted. This model combines both content-based and collaborative filtering techniques to generate more accurate and balancedrecommendations. The final recommendation score is calculated by integrating outputs from both methods.
- Similarity and Ranking Techniques: The system applies similarity measures such as cosine similarity to compute the closeness between user profiles. Based on these similarity scores and relevance metrics, the system ranks the recommendations and presents the most suitable options at the top of the list.

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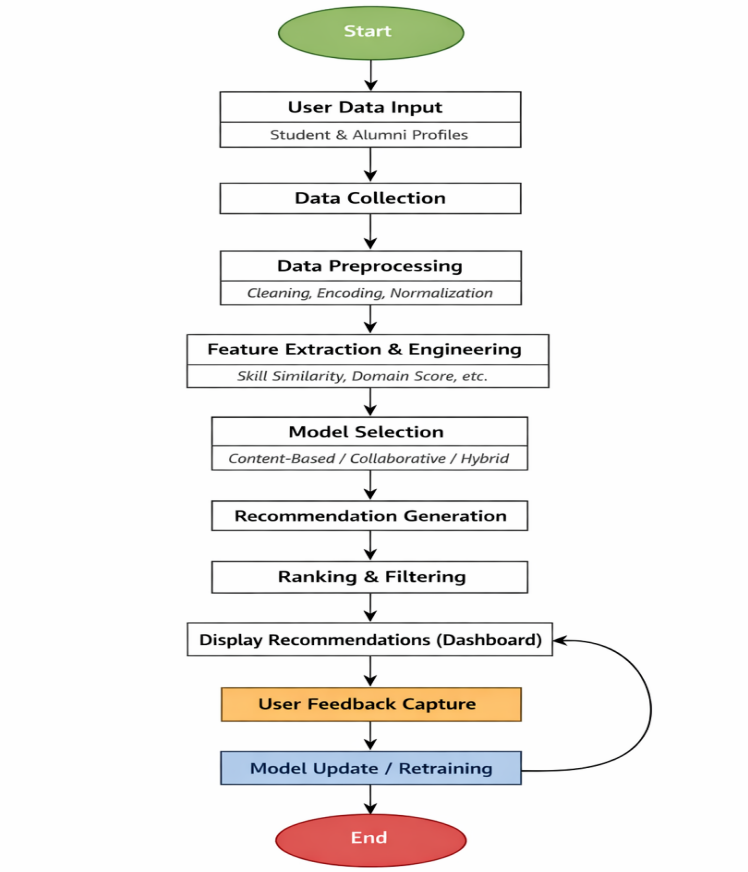



Figure 3.2: Machine Learning Recommendation Workflow of Alumni Connect Portal

## IV. SYSTEM IMPLEMENTATION

This chapter describes the actual implementation of the proposed Machine Learning–based Alumni Connect Portal. It explains the development tools and technologies used to build the system and provides a detailed description of the system modules. The implementation phase converts the system design into a working application.

### *A. Development Tools and Technologies*

The Alumni Connect Portal is implemented using a modern web development stack integrated with Machine Learning components. The selected tools and technologies are chosen based on reliability, scalability, ease of integration, and community support.

*1)* Frontend Technologies: The frontend is responsible for user interaction and presentation. It is designed to provide a responsive and user-friendly interface. Commonly used web technologies are used to design dashboards, forms, and recommendation views. The frontend communicates with the backend through secure APIs.

*2)* Backend Technologies: The backend handles business logic, user authentication, role-based access control, mentorship requests, job postings, and communication workflows. It exposes APIs for frontend interaction and integrates with the Machine Learning module to fetch recommendations.

*3)* Machine Learning Tools: The Machine Learning recommendation engine is implemented using widely used programming languages and ML libraries. The model processes user data, computes similarity and recommendation scores, and returns ranked results to the backend.

*4)* Database Management: A relational or document-based database is used to store user profiles, interaction logs, mentorship requests, job postings, and feedback. The database is structured to support both transactional operations and analytical queries required by the ML model.

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5) Development Environment and Version Control: The development process follows modular coding practices and uses version control for collaboration and change management. Testing tools are used to validate functionality and performance.

### B. System Module

The system is divided into three primary modules based on user roles: Student Module, Alumni Module, and Admin Module. Each module is designed with specific functionalities and workflows.

#### 1) Student Module

The Student Module is designed to facilitate interaction between students and alumni while providing access to career-related opportunities. Students can register on the platform and securely log in to access system features. Once authenticated, they can create and manage their profiles by entering academic details, skills, interests, and career goals. This information plays a crucial role in enabling the Machine Learning model to generate personalized recommendations.

The system provides tailored suggestions, including suitable alumni mentors, job opportunities, and relevant events, based on the student's profile and interaction history. Students can send mentorship requests to alumni and monitor the status of these requests. Additionally, they can browse and apply for job and internship opportunities posted on the platform. The module also allows students to participate in events such as workshops, webinars, and alumni sessions. Furthermore, students can submit feedback regarding their mentorship experiences, which contributes to improving the accuracy and effectiveness of the recommendation system.

#### 2) Alumni Module

The Alumni Module enables alumni to actively contribute to the platform by mentoring students and sharing professional opportunities. Alumni can register on the system and undergo a verification process conducted by administrators to ensure authenticity. Once verified, alumni can maintain and update their professional profiles, including information such as skills, industry domain, work experience, and mentorship availability.

The module allows alumni to manage mentorship requests by reviewing and either accepting or rejecting requests received from students. Alumni can also post job and internship opportunities, thereby helping students explore career options. In addition, alumni can participate in events, discussions, and knowledge-sharing sessions organized on the platform. The system provides secure communication channels that enable alumni to interact with students effectively. Alumni can also view their interaction history and provide feedback on mentorship sessions, which supports continuous improvement of the system.

#### 3) Admin Module

The Admin Module provides administrative control and monitoring capabilities to manage the overall system effectively. Administrators are responsible for managing user accounts, including approving or rejecting alumni registrations and assigning appropriate roles. One of the key responsibilities of the admin is to verify alumni credentials before granting access to the system, ensuring the authenticity and reliability of user data.

The module also allows administrators to manage platform content, including creating and organizing events, announcements, and other informational resources. Additionally, the admin can access analytics and reports related to user engagement, mentorship activities, recommendation performance, and overall system usage. The system monitoring functionality enables administra--tors to oversee system health, detect misuse, and enforce security measures. These capabilities ensure smooth system operation, data security, and compliance with platform policies.

### C. Results Analysis

This chapter presents the outcomes obtained after implementing the Machine Learning–based Alumni Connect Portal and evaluates the effectiveness of the system in real-world usage scenarios. It focuses on system outputs generated for different user roles and highlights how the platform supports alumni–student interaction, mentorship, and opportunity discovery.

#### 1) System Outputs

System outputs represent the visible results and functionalities provided by the implemented system. These outputs demonstrate how the system successfully achieves its objectives through role-based dashboards and personalized features.

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*a) Home Page*

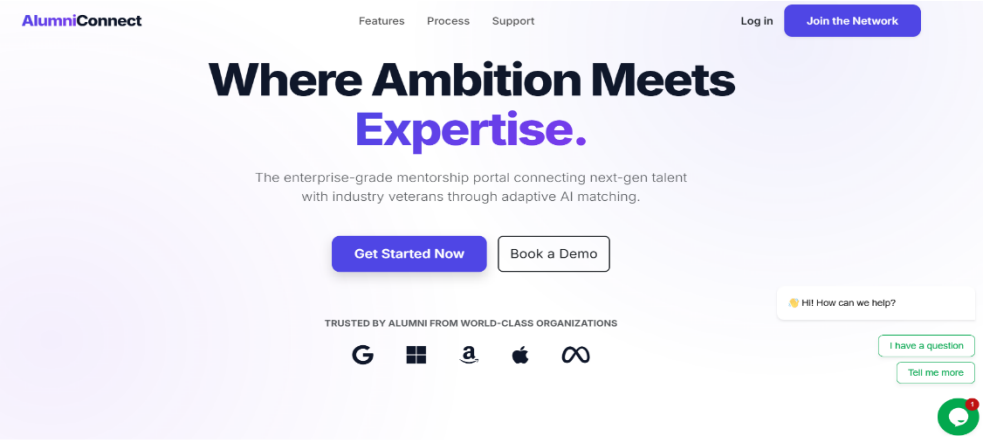



Figure 4.1: Home Page of Alumni Connect Portal

*b) User Login Page:* The Login Page allows users to securely access the system using their credentials. After successful authentication, users are redirected to their respective dashboards based on their role.

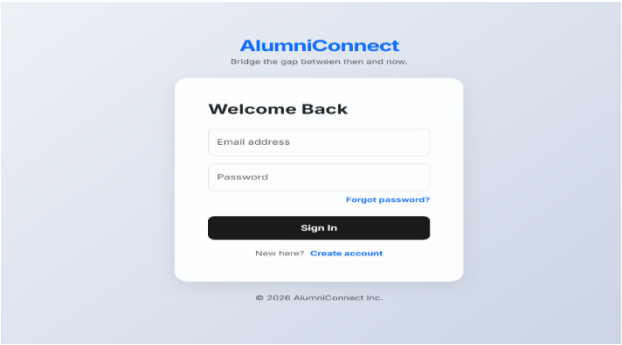



Figure 4.2: User Login Page of Alumni Connect Portal

*c)* User Registration Page: The User Registration Page allows new users to create an account by entering basic details such as name, email, password, and role. After validation, the account is created and stored in the system.

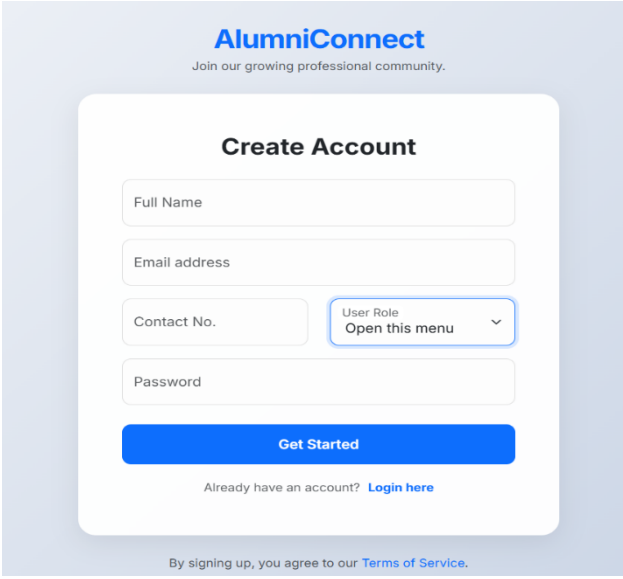



Figure 4.3: User RegistrationPage of Alumni Connect Portal

*d)* Student Dashboard: The student dashboard provides personalized recommendations for alumni mentors based on skills and interests. It also displays mentorship request status (pending, accepted, or rejected) and suggests relevant jobs and internships. Students receive event notificat-ions and can provide feedback on mentorship experiences.

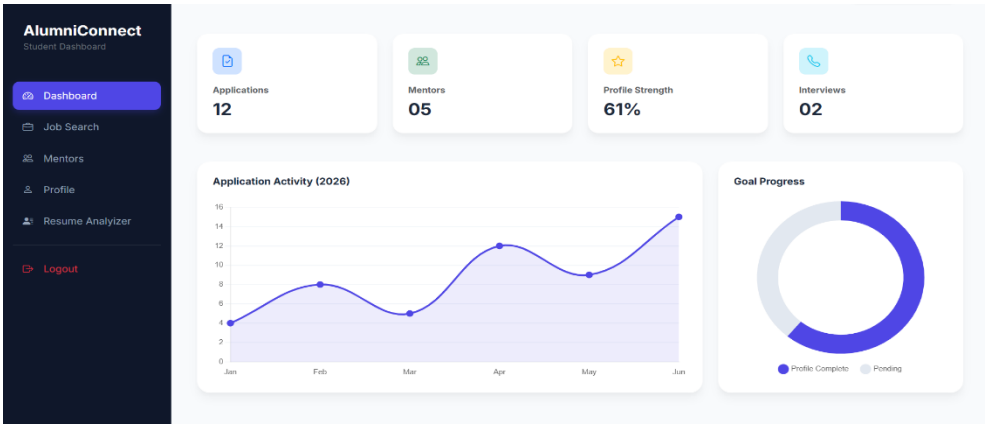



Figure 4.4: Student Dashboard of Alumni Connect Portal

*e)* Alumni Dashboard: The alumni dashboard allows users to manage mentorship requests and view student profiles. Alumni can post and update job or internship opportunities and track past interactions. It also displays event participation details and engagement history.

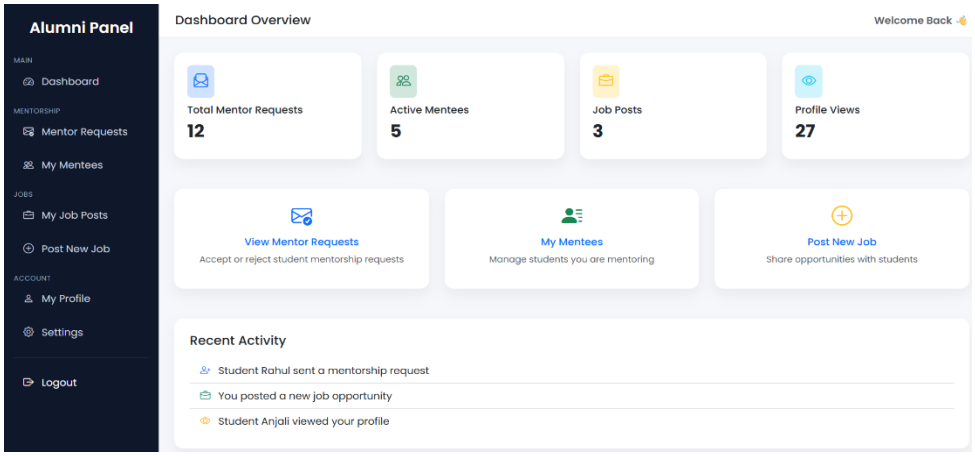



Figure 4.5: Alumni Dashboard of Alumni Connect Portal

*f)* Admin Dashboard: The admin dashboard provides tools for managing users and verifying alumni accounts. It displays system analytics, user activity, and mentorship data through reports. The panel also includes monitoring features to ensure system performance and security.

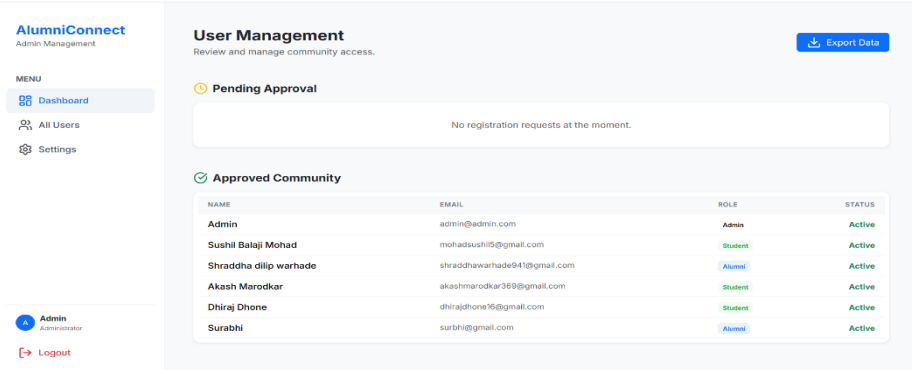



Figure 4.5: Admin Dashboard of Alumni Connect Portal

## V. CONCLUSION

This research presents the design and implementation of a Machine Learning–based Alumni Connect Portal aimed at improving interaction between students, alumni, and educational institutions through intelligent and data-driven networking. Unlike traditional alumni systems that act as static directories with limited engagement, the proposed system provides a more interactive and personalized platform.

The portal integrates a hybrid recommendation model that combines profile similarity and user interaction data to generate personalized mentorship suggestions, job opportunities, and event notifications. The system is designed using a modular architecture consisting of student, alumni, and admin modules, ensuring secure access, smooth workflows, and efficient system management. The use of Machine Learning enables the system to continuously improve recommendation accuracy based on user activity.

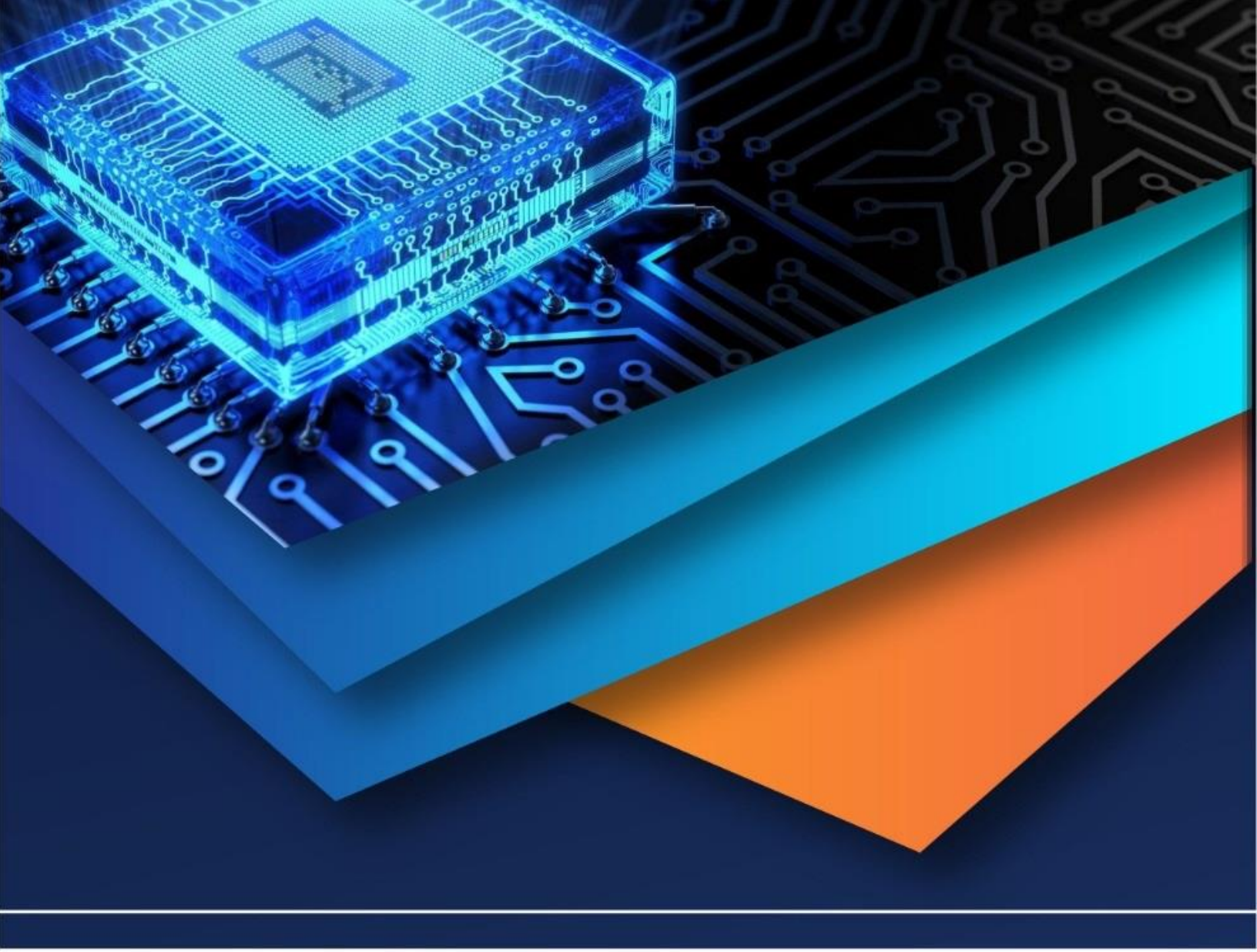
The results show that the system enhances user engagement, simplifies the process of finding suitable mentors, and promotes meaningful alumni–student interactions. It also helps administrators by providing analytics and automation for better decision-making. However, the system has some limitations such as the cold-start problem for new users, dependency on data quality, and the need for periodic model updates.

In conclusion, the proposed Alumni Connect Portal offers a scalable and intelligent solution for alumni engagement. It supports personalized mentorship, structured networking, and improved career development for students, while strengthening the connection between academia and industry.

## REFERENCES

[1] S. Kumar and R. Yadav, “Database design principles for web applications using MySQL,” International Journal of Database Systems, 2023.
[2] R. Sharma and P. Verma, “Design and implementation of an alumni management system using web technologies,” International Journal of Advanced Research in Computer Science (IJARCS), 2023.
[3] F. Ricci, L. Rokach, and B. Shapira, Recommender Systems Handbook. New York, NY, USA: Springer, 2015.
[4] C. C. Aggarwal, Recommender Systems: The Textbook. Cham, Switzerland: Springer, 2016.
[5] G. Adomavicius and A. Tuzhilin, “Toward the next generation of recommender systems: A survey of the state-of-the-art and possible extensions,” IEEE Transactions on Knowledge and Data Engineering, vol. 17, no. 6, pp. 734–749, 2005.
[6] R. Burke, “Hybrid recommender systems: Survey and experiments,” User Modeling and User-Adapted Interaction, vol. 12, no. 4, pp. 331–370, 2002.
[7] S. Zhang, L. Yao, A. Sun, and Y. Tay, “Deep learning-based recommender systems: A survey and new perspectives,” ACM Computing Surveys, vol. 52, no. 1, pp. 1–38, 2019.
[8] T. M. Mitchell, Machine Learning. New York, NY, USA: McGraw-Hill, 1997.
[9] I. Goodfellow, Y. Bengio, and A. Courville, Deep Learning. Cambridge, MA, USA: MIT Press, 2016.
[10] N. K. Jain and A. Gupta, “Design of web-based information systems for higher education institutions,” International Journal of Information Systems in Education, vol. 5, no. 2, pp. 45–53, 2020.
[11] M. Kaur and S. Singh, “Role of alumni networks in improving employability of students,” Journal of Higher Education Development, vol. 8, no. 1, pp. 22–30, 2019.
[12] P. Resnick and H. R. Varian, “Recommender systems,” Communications of the ACM, vol. 40, no. 3, pp. 56–58, 1997.
[13] B. Sailaja, V. Pratyusha, B. Tanuja, B. Pavan, and R. Vivek, “A smart alumni connect: Empowering university networks with ML driven mentorship and collaboration,” i-manager’s Journal on Artificial Intelligence & Machine Learning, vol. 3, no. 2, pp. 55–66, 2025.
[14] A. Prasad, A. Kumar, A. Kumar, and A. Yadav, “An intelligent digital platform for alumni engagement and networking,” International Journal for Multidisciplinary Research, vol. 6, no. 3, 2025.
[15] S. D. Padiya, D. Meghare, J. Bire, S. Vinchankar, and M. Maske, “Analysis of recommendat-ion systems using machine learning for alumni connect web portal,” in Proc. Int. Conf. Recent Advances in Engineering and Sciences (ICRAES), 2025.
[16] R. Garapati and M. Chakraborty, “Recommender systems in the digital age: A comprehensive review of methods, challenges, and applications,” Knowledge and Information Systems, vol. 67, pp. 6367–6411, 2025.
[17] L. A. Pinos Ullauri et al., “A recommender system of postgraduate courses based on soft skills: A psychometric-inspired approach,” International Journal of Artificial Intelligence in Education, vol. 35, pp. 2117–2153, 2025.
[18] Y. Deldjoo et al., “A review of modern recommender systems using generative models,” in Proc. ACM SIGKDD Conf., 2024.
[19] M. Papoutsoglou and N. Papoutsoglou, “Recommender systems for teachers: A systematic literature review,” Education Sciences, vol. 14, no. 7, 2024.
[20] Y. Liao, “College graduates’ employment recommendation using hybrid deep learning,” in Proc. Int. Conf. Intelligent Algorithms for Computational Intelligence Systems, 2024.

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