HU Almuni Portal

Software Requirement Specifications
presented to the academic faculty
by

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Abstract

This paper presents the development of a social media platform for the alumni of Habib University. The platform aims to provide a centralized online portal for the faculty, university administration, students, and alumni. All users except the admin will have access to the Alumni portal, where alumni of Habib University can share information about their professional lives, offer advice, share exciting opportunities, and chat with their fellow faculty members, current students of the university, and their batchmates. Additionally, students will have access to a student forum where they can ask questions, voice their concerns, and seek advice from their batchmates, which will be accessible only to current Habib students. The platform also offers the university administration an opportunity to gather data about the alumni. This paper provides a detailed description of each module of the system, which is presented in later chapters. Overall, this social media platform aims to foster a more connected and engaged community among the Habib University alumni.

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1. Introduction

1.1 Problem Statement

Habib University's first undergraduate program began in 2014. Since then, till this day, 5 batches have graduated. The Alumni community of Habib University has increased vastly since its establishment. Currently, Habib doesn't have a functional online platform to interact with all of its Alumni as well as capture their profiles and success. Even though the different departments of Habib like the Registrar Office and the Office of Career Services possess Alumni data in excel form, they are unable to maintain and update it. Furthermore, it is really difficult to ensure the data's accuracy. These issues are faced because there is no proper system or a platform for Alumni to update their information, instead, the University has utilized Questionnaires and forms which prevents the data from being accurate and up-to-date. After assessing this issue, we've come to a conclusion that an Online Interactive Alumni Portal is needed to maintain the data of the Alumni.

1.2 Proposed Solution

The goal of this website is to provide a centralized online portal for the faculty, university administration, students and alumni. All users will be able to use the Alumni portal where Alumni of Habib University can post about their professional lives, give advice, share exciting opportunities, chat with their fellow faculty members, current students of the university and their fellow batch mates. Students will be given access to the alumni portal and a student forum where they can ask questions, voice their concerns and ask for advice from their batch mates. The student forum will only be accessible for the students currently studying at Habib. The administration will be able to gather data of the alumni. A detailed description of each module of the system is presented later in Chapter 1.

1.3 Intended User

There are 3 main user profiles for the HU Alumni Portal, and so there will be 3 primary views on the platform. These are the student, alumni, and admin views. All three views will have the functionality of managing their own user account which will get stored in the database. They'll also have access to a shared landing page.

The student view will be for current students of Habib University. There will be some added functionality in the profile section, where students can update their details such as their batch, major/minor(s), a short bio, or a profile picture. Next, they'll have access to a students only forum, which will be a Facebook/Reddit style social area where students can have discussions and socialize. Students will also have access to the Alumni forum in order to facilitate communication with graduates. Finally, chat features will be available, both in the form of group-based chat rooms and private messaging with other users.

The alumni view will cater to all current and future graduates of Habib University. In addition to the aforementioned features like a profile and dashboard, they'll have access to the Alumni forum and chat features just like students do. An alumni profile will be different however. It will have fields for grad school and employment history, along with current employment status. We will be integrating the alumni profile page with each user's respective LinkedIn account to ensure the information is accurate and up to date.

The administration view is designed for university staff members to manage a comprehensive set of data available on the platform and carry out administrative duties. Similar to the previous two views, administrators can establish a profile and utilize chat features. The primary functionality for administrators is the analytics tool, which enables them to access batch-wise statistical data such as the current location, and place of study or work of the students. Additionally, the administrators have the ability to conduct custom queries, filtering data based on the available fields. The resulting data will be visually represented through various graphical representations such as bar charts, pie charts, and lists. Moreover, the administrators can generate and download reports based on these analytical findings.

1.4 Project gantt chart and deliverables

1.4.1 Deliverables

- Deployed and fully functional website
  - Student forum that provides a platform for currently enrolled students to interact with each other, share knowledge and experiences, and seek support on a range of academic and personal topics.
  - Alumni forum that serves as a platform for currently enrolled students, alumni, and professors of Habib University to interact with one another. The forum is intended to facilitate the exchange of knowledge, ideas, and experiences across generations of the Habib University community, fostering a sense of connection and collaboration that extends beyond the confines of the university campus.
  - Analytics dashboard that provides an efficient and effective way for the admin to access and review key data related to the student body. Equipped with a variety of tools such as bar charts, pie charts, and lists, the dashboard will allow the admin to easily analyze and interpret data related to student demographics, geographic locations, and career outcomes. With separate pages for each graph and major-wise filters, the admin can navigate the dashboard seamlessly, gaining insights into the number of students in different countries, where they are employed, and if they are pursuing higher studies. The admin will also have access to a custom queried list, which allows for customized reports and analysis of specific student data based on built-in filters. Overall, the analytics dashboard will provide the administration with deep insights into the student body, allowing for data-driven decision-making and a better understanding of the student body's needs, ultimately contributing to the institution's overall success.
  - Friend recommender system for students and alumni to get real-time suggestions for people to follow using user-based collaborative filtering, considering the skills for each user. Users will get recommended to other users based on similarity of skills
  - ProxyCrawl is a web scraping service that provides access to data from LinkedIn. The service uses a network of proxy servers to bypass website restrictions and capture data in a structured format. To scrape data from LinkedIn, ProxyCrawl uses automated bots that browse through

LinkedIn's pages and extract information from public profiles, such as name, job title, company, education, and location. The bots can also follow links to related pages, such as company pages or job listings, and collect additional data. So for each user wanting to add they're LinkedIn details, one request will have to be sent to the server which will extract the data from LinkedIn and display it on the Alumni's profile.

1.4.2 Project Gantt Chart

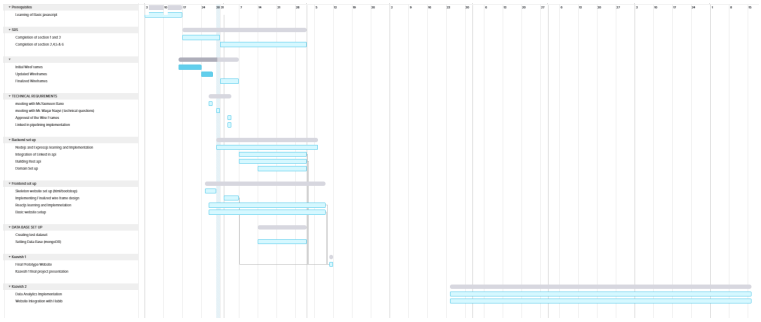


Figure 1.1: Gantt Chart

1.5 Key Challenges

There are a few challenges that we have faced for now and some proposed solutions.

- The technology Habib University used to make its PSCS, CANVAS website should be in line with our Alumni Portal. Habib University has used WordPress as the front-end and PHP in the back-end and the Alumni portal will me made using MERN Stack.
  Solution: The Alumni portal can be a standalone website wtihin the Habib domain. For now, we will use our own domain. When it gets approved by the director of the IT department, we will work on the integration in Kaavish II along with the mobile application.

- Facing hurdles in getting Habib's database.
  Solution: For now, we will use a test dataset until. Habib uses Micrsoft AD

which is a directory service used for centralized domain management. This is used to integrate the database. Since there are certain standards of procedure in getting access to Habib's database, we are facing some issues and have decided to use test data for now until we get access to Habib's database.

- Integration of LinkedIn API
  Solution: One of the many features of this website is to integrate the Alumni's LinkedIn profile with the Portal's profile. However, an Alumni can post something on their LinkedIn that might not be something neccessary that needs to be posted on the Portal. There are two solutions to this, one could be that using an API that would save all the information coming from LinkedIn to a PDF and then it would be posted on the Portal but that doesn't seem like a viable option. Another option would be to filter out posts from the API which are appropriate for the Portal.

- Security of the website
  Solution: For the website to be officially used by Habib University, it would require for the website to be secure, the chats to be encrypted and the database to be secure. We will work with the IT department to see which security would be best, well suited and up to the standard of security Habib has on its websites.

2. Literature Review

The main goal of an Alumni Portal is to bridge the gap between students and Alumni and that is something that lacks at Habib University. There is no functional Alumni portal to help current students to reach out to their Alumni for guidance. However, there is an existing portal that allows Alumni to submit a form about their professional life after graduation, it is not a forum. Habib University requires a platform where students, teachers and alumni can converse, seek help and guidance from one another and help each other prosper. It is essential for students to interact with people who graduated from the same university and major to be able to get an idea about the next step in their journey after pursuing an undergraduate degree. Even though Habib University has excellent counsellors, they still won't have that insight about the next steps after graduation that recent alumni have and to fix this issue, our goal is to create an interactive online platform that can be used as a forum for all students, teachers and Alumni. There are numerous ways in which alumni can help current students into making better decisions about their life after graduation. According to different majors, they can guide students about whether it is a better decision to opt for higher studies or work. They can help direct students to specific countries, universities, courses if they want to opt for higher studies or steer them into the direction of a professional life, where they could work, if there are currently any open jobs in the market that they know about and would fit the job description for the student.

2.1 Existing Solutions

2.1.1 Habib University Alumni Portal

Perhaps the closest resource we can take into account is Habib University's very own Alumni Portal. However, the existing portal doesn't function as a forum. It's a forum containing a database of scholarships that are offered all around the world. A form is included which an alumni can fill, it asks about current job status, if the alumni has pursued a degree/diploma right after graduation and more information about the alumni's career history [1]. There is another section about alumni jobs and policies. In total, the portal contains 4 sections.
But the main issue with this portal is that it doesn't offer a forum where students can engage with their alumni. Some sections can't be accessed by students like the alumni job, policies and career update. All the information gathered from this website through this form is stored in CSV files with the office of career services. It is very difficult for the administration to maintain and analyse this data. In conclusion, it does not bridge the gap between students and their fellow alumni.

2.1.2 Yammer

Another big name that comes to mind when talking about a forum is Yammer. Habib has a Yammer forum which provides a similar functionality like our Alumni Portal. It's a forum where students can interact with their professors, alumni as well as post their achievements, career history and any interesting news they want to share. It also has a chat feature which allows users to chat with other users privately. Like groups, Yammer has communities where a group of people can be added and they can post things that are only visible to the members of the group [2].
However, it does not function as an Alumni portal should. It is very similar to any other social media forum. It has a profile for each user but those profiles can't be modified in a way that the office of career services can generate a report of to analyse it. There are no separate options to choose from. An option would include whether the user chose to study or work after graduation, the data would be displayed accordingly. In a way, it does bridge the gap between alumni and students but it is not streamlined enough to be an alumni portal.

2.1.3 Our Novelty

The previous section mentions 2 resources that have used a similar approach as our alumni portal. Yammer provides some functionality that our portal provides but it is not streamlined enough. The existing Habib University Alumni Portal does not contain a forum which doesn't bridge the gap between students but provides data to the office of career services. However, it is hard to maintain and analyse it since it's in a CSV form. Our portal offers an interactive platform, like a forum where students, teachers and alumni can post about their achievements, about current job openings in the market, collaborations on research papers. It consist of a chat function where students can talk to their alumni privately and ask for advice. Moreover, our website will have a LinkedIn API integrated. This API will allow users to connect their LinkedIn profile to the portal which would automatically copy posts that a user makes on LinkedIn and paste it on the Alumni Forum which would help their profile get updated regularly without having to post it again on the forum.

Furthermore, Our portal will store all the data of the Alumni and generate a report of certain majors/batches which would give insight on how many students choose to pursue higher studies. The office of career services would have an option to generate and download a report batch wise which would help them analyse the data for the Alumni. The report would include how many students started working right after their Undergraduate degree, their majors and GPA. The same would be done for students who opted for higher studies. It would help the office deduce how many students want to work or study according to their major, academic and extra curricular history. It would also be easier for them to reach out to the alumni and would help them keep track of all the students' professional lives.

One feature that will be implemented to enhance user engagement and connectivity within the HU Alumni portal, a social media platform, is a recommendation system. This system will utilize the user's skills, to suggest other users with similar skills. By analyzing the user's activity patterns, the recommendation system will provide personalized suggestions, thereby facilitating new connections and expanding the user's network. Additionally, the recommendation system will incorporate machine learning algorithms to continually refine the recommendations and improve the user experience. Ultimately, this recommendation system will foster a more engaging and interconnected community within the HU Alumni portal.

3. Software Requirement Specification (SRS)

This chapter provides detailed specifications of the system under development.

3.1 Functional Requirements

This section describes each function/feature provided by our system. These functions are logically grouped into modules/views based on their users (as per our system). A functional hierarchy may look like:

- Login Page: There will be a login page that consists of four login options:
  - Student Login
  - Alumni Login
  - Faculty Login
  - Admin Login
- Home Page: The home page will consist of different tabs for each view, students, alumni, faculty and admin.
  - Students, alumni and faculty will be greeted with a forum page, as in Figure 3.3, with groups, according to the different forums they can access.
  - Admin members, such as Office of Career Services, will be greeted with the student dashboard. They will also have an option to view a student's/Alumna's profile.
  - Students, alumni and faculty will be suggested people to follow based on their activity.

- Student View: There will be a specific view of the site dedicated to students to allow them to use certain features of the Alumni Portal
  - View Student Profile: Students will be able to view and edit their own profile consisting of basic information and a biography, as well as view other students' profiles.
  - View Alumni Profiles: Students will be able to view alumni profiles, including general information, career success history and service history, limited to the alumni's privacy settings.
  - View Faculty Profile: Students will be able to view Faculty members' profiles.
  - Posts on student and alumni specific forum: Students will be able to create, share and react to posts on the student and alumni forum.
  - Posts on student and alumni forum: Students will be able to create, share, comment on, and react to posts on the forum for students, and alumni.
- Alumni View:
  - View Alumni Profiles: Alumni will be able to view other alumni's profiles, limited to the profile's privacy settings.
  - View Student Profiles: Alumni will be able to view currently enrolled student profiles.
  - View Faculty Profiles: View Faculty Profile: Students will be able to view Faculty members' profiles.
  - Posts on alumni specific forum: Alumni will be able to create, share, comment on, and react to posts on the alumni forum.
  - Set Privacy Settings: Alumni will be able to set what information students and other alumni will be able to see.
    * Setting Post Privacy: Alumni will be able to set the privacy setting on each individual post they make on the forum.
    * Setting Profile Privacy: In addition to setting post privacy, alumni will be able to choose who can see any work/study/publication history they have on their profile. The same goes for the separate pages for Career Success History, Service History, and Achievement Section.
- Faculty View: There will be a specific view of the site dedicated to faculty members, allowing them to use specific features of the portal.

  - Posts on alumni forum: Faculty members will be able to create, share, comment on, and react to posts on the forum for alumni.
  - View Alumni Profiles: Faculty members will be able to view other alumni's profiles, limited to the profile's privacy settings.
  - View Student Profiles: Faculty members will be able to view currently enrolled student profiles.
  - View Faculty Profiles: Faculty members will be able to view Faculty members' profiles, as well as keep and edit basic information on their own profiles.

- Admin View: Admins (members of the alumni office and other concerned parties) will be able to access features of the site limited to the admin view only.
  - View Alumni Profiles: Admin members will have full access to alumni profiles, in order to analyse career information.
  - View Student Profiles: Admin members will be able to view currently enrolled student profiles.
  - Data Analysis:
    * Admin Members will be able to access a page which includes functionality to search for alumni career information based on search parameters, such as major, batch, whether they went for masters right after completing their degree, their chosen field of work, etc.
    * Based on search parameters as described above, admins will be able to create reports, detailing alumni information as they see fit.

3.2 Non-functional Requirements

This sections mentions the specific non-functional requirements of our system. These generally address performance, scalability, safety, availability, deployment etc.

- Usability:
  - Website Basic Outlook: The website will designed in such a way that the user of the website (alumni, student, instructors and admin) can easily traverse through the web pages.

  - Implementation of accessibility tools: The website will also be filled with tools that will help them use the site to its utmost potential. This will include:
    * An editor when they are writing a post.
    * Dark mode for eye protection. etc.

- Reliability:
  - In case of a sudden WiFi disconnection the web page will be updated until to the point of the WiFi connection.
  - When the WiFi reconnects to the device the web page will not be reloaded to being using it again.

- Supportability:
  - IT support:The website will need a hybrid of inhouse and remote support
  - Rest API: The rest api allows us to add more new applications to the existing system. So the website can be made better.

3.3 External Interfaces

3.3.1 User Interfaces

The technology that will be used to make the website is stated below.

- Front End: ReactJS
- Back End: ExpressJS
- Database: MongoDB
- Environment: NodeJS

The screens are shown below with a brief explanation.

The user can login with their Habib credentials from this page.

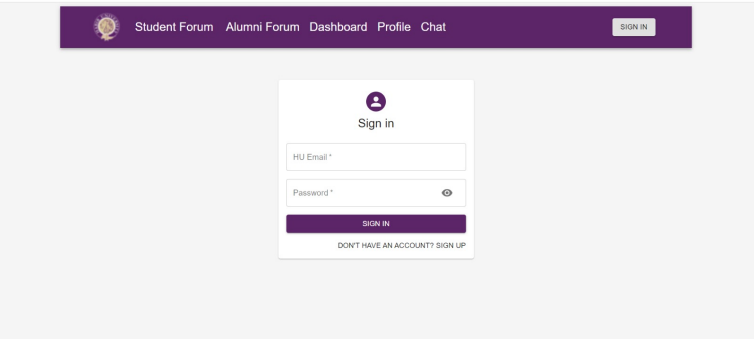


Figure 3.1: Login Page

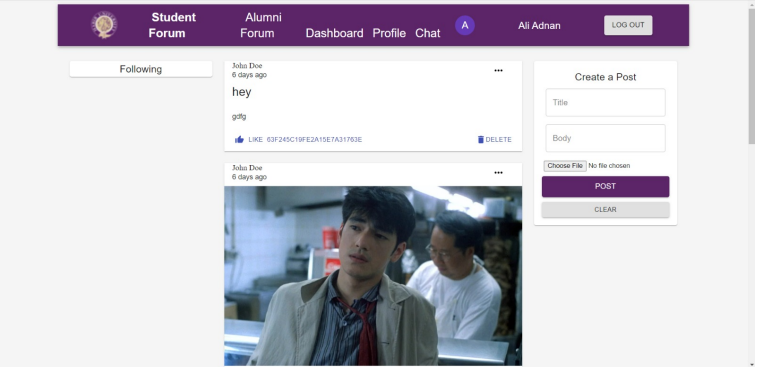


Figure 3.2: Alumni/Student Forum Page

After logging in, the student will land on the forum page, where he can post, comment, redirected to the chats page. The UI for the Alumni Forum and Student Forum is a work in progress and will be the almost the same.

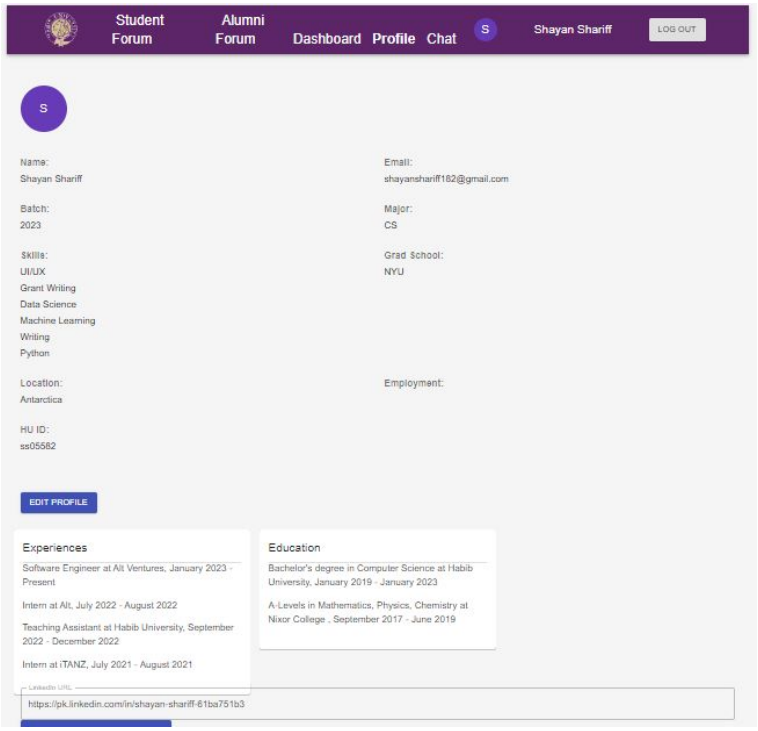


Figure 3.3: Profile

Clicking on the Profile link from the navbar will take a user to their own profile, where they will be able to view and edit their information. Moreover, if another user's name is clicked from their post on the forum, that action will take the current user to that user's profile. The UI for profile is also a work in progress.

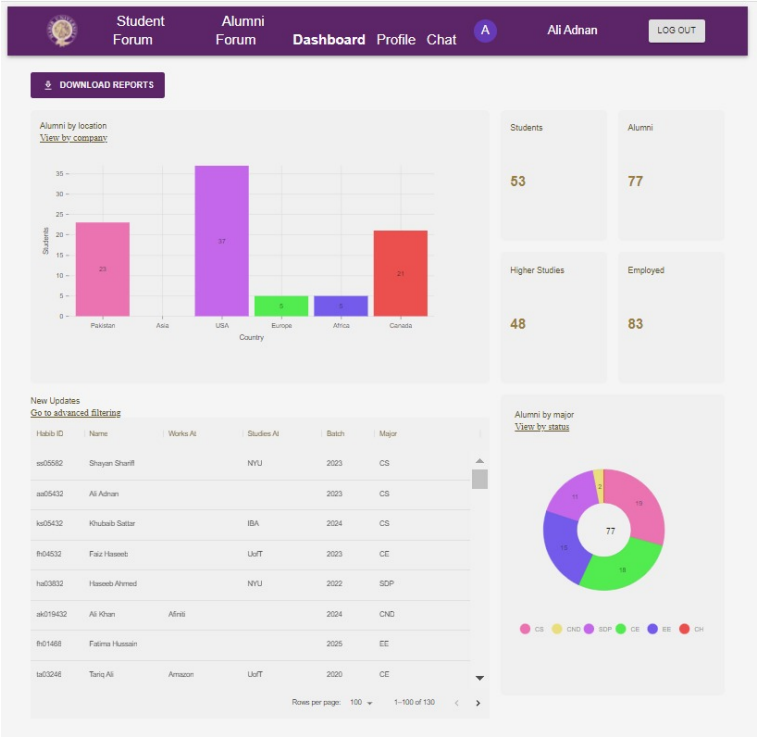


Figure 3.4: Data Analytics Dashboard

Clicking on the Dashboard link from the navbar will take an admin user to the Data Analytics dashboard where they will be able to view data on the alumni and generate custom graphs using the data.

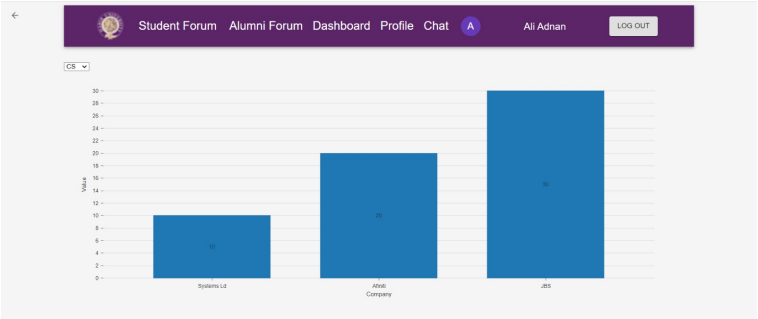


Figure 3.5: Custom Graphs Example 1

This is an example of a graph a user can generate using this feature, which shows the number of alumni employed at different companies, sorted by major.

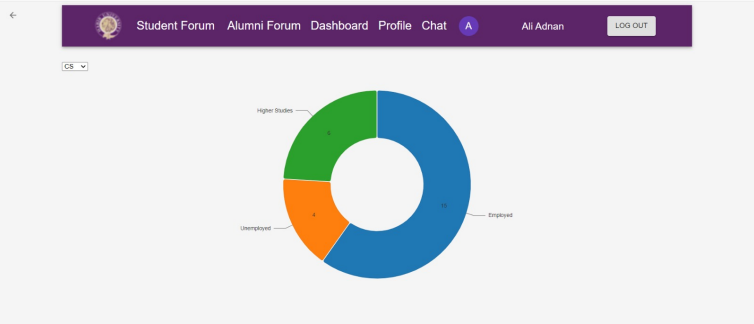


Figure 3.6: Custom Graphs Example 2
This is another example of a graph, which shows employment status of alumni based on major.

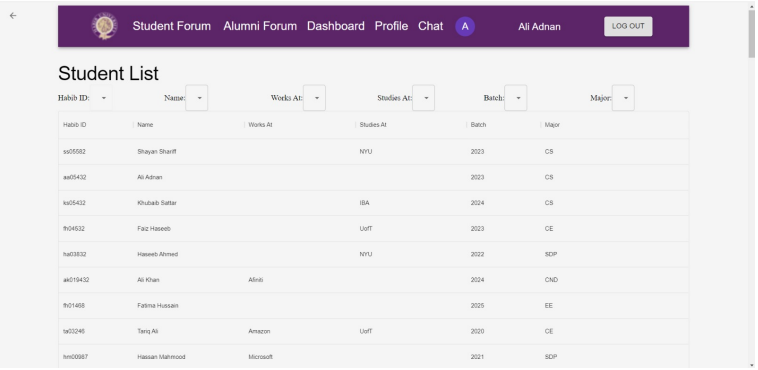


Figure 3.7: Custom Filtering and Student List
Another feature of the Data Analytics module is ability to filter and query the list of alumni based on a number of factors as shown in the figure.

3.3.2 Application Program Interface (API)

LinkedIn Profile API: This API will fetch the information from the Alumni's LinkedIn profile and it will display it on the Alumni Forum. Whenever the Alumni posts something on his LinkedIn profile, the API will automatically post it on the Alumni Forum. The Alumni will have an option to connect their profile to their LinkedIn profile.

3.3.3 Hardware/Communication Interfaces

The user should be equipped with a device (A mobile phone or a computer), a working Network Interface Card and a stable internet connection.
The Alumni Portal requires a stable internet connection and shall use an HTTPS protocol to facilitate a secure connection over the internet.

3.4 Use Cases

3.4.1 Alumni

- Access alumni forum
  - Make, edit, comment on or delete posts on the alumni forum
  - View other users' posts and react to or comment on them
- Direct messaging
  - Go to the messages section on the website
  - Start a new chat with one or multiple users or access an existing chat
  - Send and receive instant messages
- Access user profiles
  - Click on any user's name to be taken to their profile page
  - View details set to public visibility on their profile and details set to friends if the user is added as a friend
  - Start a chat with them or be taken to an existing chat if applicable
  - Send the user a friend request

- Access own profile
  - Click their profile picture to go to their profile page
  - Edit privacy settings
  - Edit information such as employment and education history, hobbies, profile picture, friends list, publication history, etc
  - Connect their LinkedIn account to access data from the LinkedIn API

3.4.2 Student

- Access student and alumni forum
  - Make, edit, or delete posts on the student or alumni forum
  - View other users' posts and react to or comment on them
- Access user profiles
  - Click on any user's name to be taken to their profile page
  - View details set to public visibility on their profile and details set to friends if the user is added as a friend
  - Start a chat with them or be taken to an existing chat if applicable
  - Send the user a friend request
- Access own profile
  - Click their profile picture to go to their profile page
  - Edit privacy settings
  - Edit information such as courses taken, hobbies, clubs, extra curriculars, etc

3.4.3 Faculty

- Access alumni forum
  - Make, edit, comment on or delete posts on the alumni forum
  - View other users' posts and react to or comment on them
- Access user profiles

  - Click on any user's name to be taken to their profile page
  - View details set to public visibility on their profile and details set to friends if the user is added as a friend
  - Start a chat with them or be taken to an existing chat if applicable
  - Send the user a friend request

- Access own profile
  - Click their profile picture to go to their profile page
  - Edit privacy settings
  - Edit information such as qualifications, publications, courses taught, research areas, etc

3.4.4 Admin

- Access data analytics page
  - View visualizations of large scale data
  - View data at an individual user's level
  - Filter data based on provided search parameters
  - Generate and download customized reports depending on parameters required

- Access user profiles
  - Click on any user's name to be taken to their profile page
  - View details set to public visibility on their profile and details set to friends if the user is added as a friend
  - Start a chat with them or be taken to an existing chat if applicable
  - Send the user a friend request

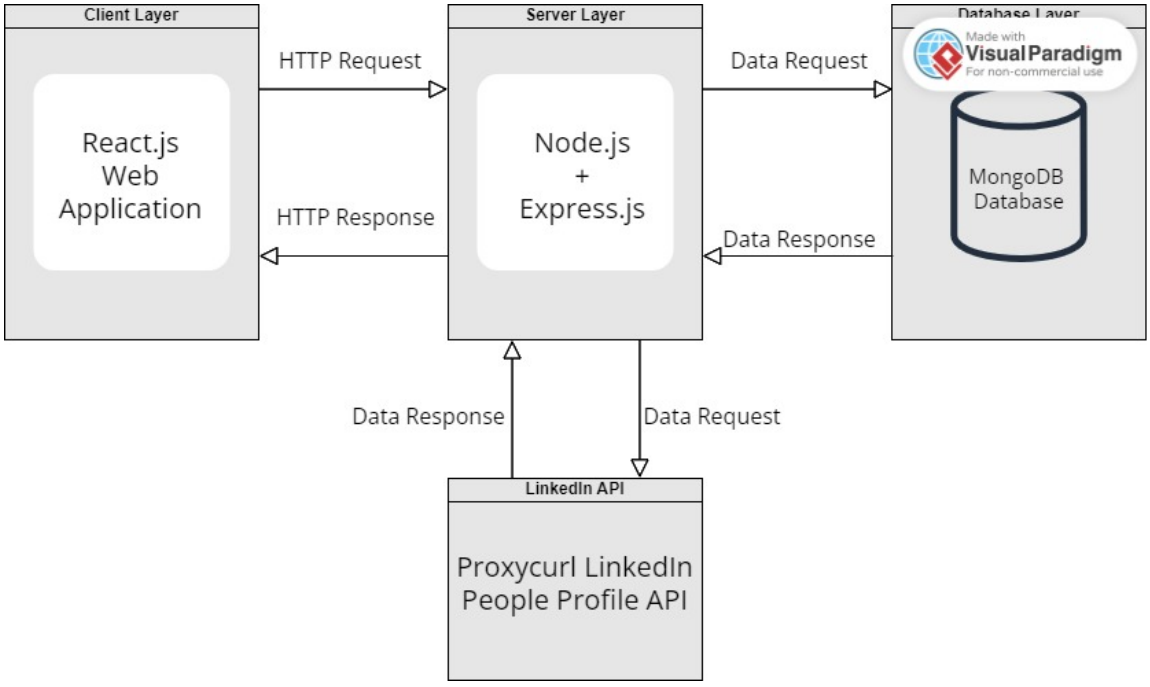
3.5 Datasets

We have created our own database using MongoDB which is incorporated into our website. To make the graphs better looking, we have added substantial users to our database. Our current database has four different types of users including Alumni,

Student, Professor, Administration. For the alumni user, the data model is as follows:
name: type: String, required: true , usertypetype: String, required: true ,email: type: String, required: true, password: type: String, required: true, batch: type: String, required: true, major: type: String, required: true, location: type: String, isgradschool: type: Boolean, gradschool: type: String, gradschoolDate: type: Date, isemployed: type: Boolean, employment: type: String, employmentdate: type: Date, huID: type: String, id: type: String, following: [type: mongoose.Schema.Types.ObjectId, ref: 'User'], followers: [type: mongoose.Schema.Types.ObjectId, ref: 'User']
Since we haven't gotten the data from any external source, there is no link to provide. All the data has been created internally.

3.6 System Diagram

This diagram gives a high-level view of the different components of our system and the interactions between them. Each component and the particular tools/technologies/libraries used to build it are described.

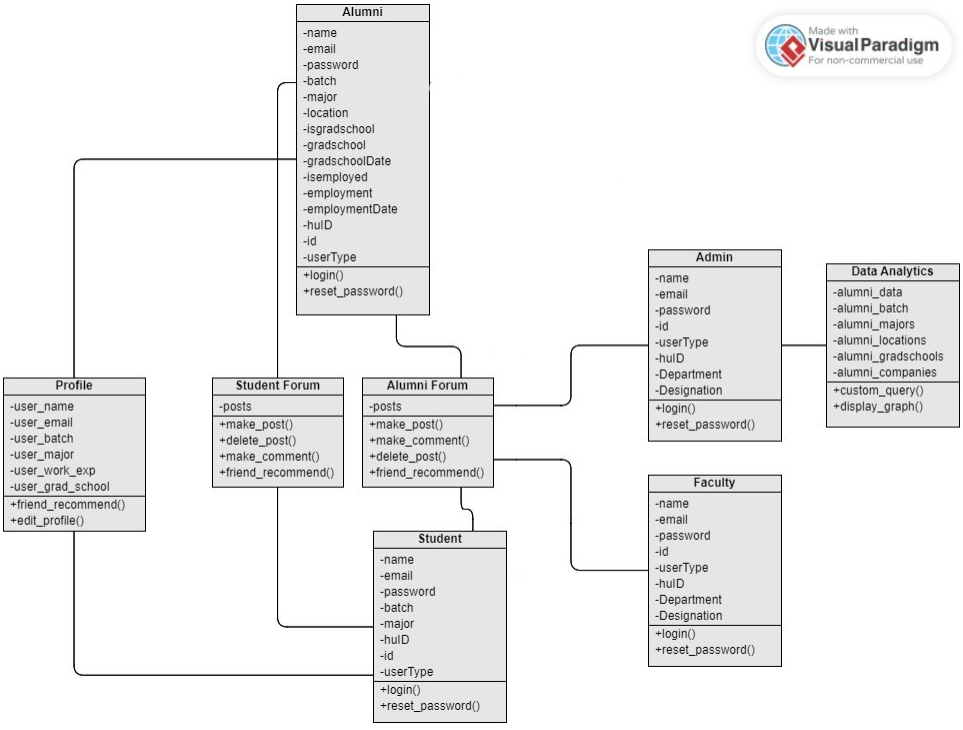


4. Software Design Specification (SDS)

This chapter provides important artifacts related to design of our project.

4.1 Software Design

This section presents the UML class diagram and gives a brief description of each class in our system. Attributes and methods of each class and relationship among classes are clearly presented.



- Alumni: This Class provides alumni with features to use the alumni forum, the chat features, modify their profile information, and search for other alumni profiles.
- Students: Provides Students with the means to post and interact with other posts on the forum, search for alumni profiles, and update their own basic information on their own profile.
- Faculty: Allows members of the faculty of Habib University to engage with the forum.
- Admin: Admin will be able to access all contents of the forum and all alumni, student and faculty profiles, using search functionality.
- Login: Login functionality allowing alumni, students, faculty, and admin users to login and logout
- Posts: Allows alumni, students, faculty, and admins to view, like, and comment on posts made on the forum.
- Data Analytics: This class will allow Admin users to search and categorise Alumni based on criteria that they define beforehand, for example, based on gender, or what career path they chose right after completing their time at Habib University. They will also be able to generate reports of these searches.

4.2 Data Design

This section presents the structure of our database that caters to persistent data storage in our project. The structure is shown as a normalized data model for relational databases. It clearly shows entities, attributes, relationships with their cardinalities, and primary and foreign keys. We have used DB designer (or any other similar data modeling tool) to build our data model.

4.3 Technical Details

4.3.1 Friend Recommender System

In this section, we discuss our implementation of the friend recommender system for students, faculty and alumni to get real-time suggestions for people to follow. We make use of user-based collaborative filtering, considering the skills data for each user.

Collect user data: We have access to skills data for each user. This information is used to create an interaction matrix, where rows and columns both represent users. Initially, we were tracking users as rows and interaction features as columns, but this approach is not scalable, consequently we opted to go with a user-user matrix. Each entry in the matrix indicates the strength or count of a particular interaction for a user.

Calculate similarity scores: We implement a similarity metric to measure the similarity between users based on their interactions. For each pair of users, we calculate the cosine similarity using their interaction vectors (rows in the interaction matrix).

Find nearest neighbors: For each user, we identify a set of k nearest neighbors based on the calculated similarity scores. We store these nearest neighbors along with their similarity scores for each user.

Generate recommendations: To recommend friends for a user, we examine the nearest neighbors and identify users that the target user is not already following. These potential friends are ranked by their similarity scores, and the top n users are recommended as friends.

This approach allows us to generate friend recommendations based on the similarity of user interactions with the content.

User	User1	User2	User3	User4
User1	0	0	0	1
User2	0	0	1	0
User3	1	1	0	0
⋮	⋮	⋮	⋮	⋮

Table 4.1: Interaction matrix

5. Design and Methodology

5.1 Goals and Objectives:

The goal of this alumni portal is to connect the undergraduates that are currently studying at Habib University with the alumni who have graduated from Habib University and are now working in the industry or pursuing further studies. The alumni portal aims to provide a platform for interaction and sharing of opportunities, such as job vacancies, internships, and graduate programs. Additionally, the portal will allow current students to gain insights into the skills that are in high demand in the industry and receive guidance on how to make a successful application to universities for graduate programs. The ultimate objective of this portal is to foster a strong community of Habib University alumni and current students, and to enable them to support and learn from each other.

5.2 User Personas:

User Personas

Alumni - Ahmed

- Ahmed is a 27-year-old graduate of Habib University, who currently works at a multinational company as a software engineer.
- Ahmed is looking for opportunities to give back to his alma mater and help current students.
- Ahmed wants to stay connected with other alumni and keep up-to-date with the latest developments at Habib University.
- Ahmed is tech-savvy and comfortable with using online tools and platforms.

Undergraduate Student - Ayesha

- Ayesha is a 20-year-old undergraduate student at Habib University, currently in her third year of study.
- Ayesha is interested in pursuing a career in the tech industry and is looking for guidance and mentorship from alumni.
- Ayesha wants to learn about the latest developments in the industry and the skills that are in high demand.
- Ayesha is comfortable using online tools and platforms for communication and learning.

Office of Career Services (OCS) - Mr. Ali

- Mr. Ali is the head of the Office of Career Services at Habib University.
- Mr. Ali wants to use the alumni portal to gather information about alumni and their careers, in order to better advise current students.
- Mr. Ali wants to keep track of the job opportunities and internships that are shared on the portal, in order to help students find suitable opportunities.
- Mr. Ali is comfortable using online tools and platforms for communication and data analysis.

5.3 Information Architecture

The information architecture of the alumni portal is designed to provide easy navigation and access to the different features and functionalities of the portal. The portal has two main sections, the Alumni Portal and the Student Forum.

Alumni Portal

The Alumni Portal will be the central communication platform for the alumni community. It will consist of the following pages:

- **Home**: This page will provide an overview of the alumni community and the latest news and updates related to the community. It will have a search bar to search for specific alumni profiles or posts. It will also have a section showing recommendations for other users to follow.

- **Profiles**: This page will list all the alumni profiles registered on the portal. Alumni will be able to create and manage their profiles, add their achievements, and update their career progress. Users will be able to search for alumni based on different criteria, such as location, industry, and graduation year.

- **Posts**: This page will allow alumni to create and share posts related to job opportunities, internships, research opportunities, or general queries related to higher education and career. Users will be able to comment and engage with each other on the posts.

Student Forum

The Student Forum will be a platform for undergraduate students to communicate with each other and with the alumni community. It will consist of the following pages:

- **Home**: This page will provide an overview of the student community and the latest news and updates related to the community. It will have a search bar to search for specific student profiles or posts. It will also have a section showing recommendations for other users to follow.

- **Profiles**: This page will list all the undergraduate student profiles registered on the portal. Students will be able to create and manage their profiles, add their achievements, and update their academic progress.

- **Posts**: This page will allow students to create and share posts related to their academic or career-related queries, such as seeking advice on graduate programs or research opportunities. Users will be able to comment and engage with each other on the posts.

The navigation of the portal will be intuitive and user-friendly, with clear labels and categories for easy access to the different pages and features.

Here is an example of how you can write the development tools section in LaTeX format:

5.4 Development Tools

For the development of the alumni portal, we utilized the MERN stack, which is a popular and powerful technology stack for building web applications. The MERN stack includes the following technologies:

5.4.1 MongoDB

MongoDB is a popular NoSQL database that is used for building scalable and flexible web applications. It was used as the database for the alumni portal, allowing us to store user information and other relevant data.

5.4.2 Express.js

Express.js is a popular web framework for Node.js that allows for the creation of robust web applications. It was used as the backend framework for the alumni portal, providing a scalable and secure foundation for the application.

5.4.3 React

React is a popular frontend JavaScript library for building user interfaces. It was used for building the frontend of the alumni portal, providing a seamless and intuitive user experience for the alumni and students.

5.4.4 Material-UI

Material-UI is a popular React UI library that provides pre-built components for building responsive and aesthetically pleasing web applications. We used it to style and design the frontend of the alumni portal.

```
import React from 'react';
import { makeStyles } from '@material-ui/core/styles';
import Button from '@material-ui/core/Button';

const useStyles = makeStyles((theme) => ({
root: {
'& > *': {
margin: theme.spacing(1),
},
},
}));

export default function MyButton() {
const classes = useStyles();
```

```
return (
<div className={classes.root}>
<Button variant="contained" color="primary">
Hello, Material UI!
</Button>
</div>
);
}
```

In this example, we import the makeStyles function from Material UI's core/styles module, which allows us to define custom styles for our components using the useStyles hook.

We then define a simple component called MyButton that renders a Material UI Button component with the label "Hello, Material UI!". We apply custom styles to the component using the classes object returned by the useStyles hook.

This is just a simple example of using Material UI in React. Material UI provides many other components and utilities that can be used to create a beautiful and functional user interface.

5.4.5 Node.js

Node.js is a powerful JavaScript runtime that allows for the creation of server-side applications. It was used as the runtime environment for the alumni portal, allowing us to build scalable and performant applications.

This is a simple example of how we used Express.js to create a basic server that listens on port 3000 and responds with "Hello World!" when a GET request is made to the root URL.

5.4.6 Friends Recommendation System

Friends Recommendation System

As a part of the alumni portal project, we will also be implementing a Friends Recommendation System using collaborative filtering. The system will use the user's common skills with other users to suggest potential friends or connections. Cosine similarity will be used to measure the similarity between user profiles and recommend relevant connections.

To implement the Friends Recommendation System, we will use Python as the primary programming language, and leverage libraries such as NumPy and Pandas

for matrix generation and vector operations. We will collect user data on skills added by them on their profile. The model will be trained using historical data, and will be updated periodically as new data becomes available.

The Friends Recommendation System is currently a work in progress, and we are continuously exploring new concepts and techniques to improve the accuracy and usefulness of the recommendations. As we gather more data and refine our models, we aim to provide more personalized and relevant suggestions to our users.

6. Experiments and Results

6.1 Experiments

In this section, we discuss potential improvements to the recommender system in order to enhance its performance and capabilities. We explore the addition of more interactions, scalability optimizations, and the incorporation of machine learning techniques to further refine the recommendations.

6.1.1 Adding More Interactions

Adding more interaction types can help improve the quality of the recommendations by capturing a more comprehensive understanding of user preferences. Some additional interactions that could be considered are:

- Shares: The number of times a user shares a post can indicate their interest in the content.
- Reactions: Different types of reactions (e.g., love, angry, sad) can provide more nuanced insights into user preferences.
- Time spent: The amount of time a user spends on a post can indicate their level of engagement and interest in the content.
- Comments: The number of times a user has commented on posts by other users.

Incorporating these additional interactions into the collaborative filtering process can help generate more accurate recommendations based on a richer understanding of user behavior.

6.1.2 Optimizing for Scalability

As the number of users and posts grows, it becomes increasingly important to optimize the recommender system for scalability. Some strategies to achieve this include:

1. Reducing the dimensionality of the interaction matrix using techniques like singular value decomposition.
2. Caching recommendations and updating them periodically, instead of recalculating them for each request.

Implementing these optimizations can help ensure that the recommender system remains responsive and efficient as the platform scales.

6.1.3 Incorporating Machine Learning

Machine learning techniques can be used to further enhance the recommender system by incorporating additional sources of information and more advanced algorithms. Some potential improvements include:

- Content-based filtering: Incorporating information about user profiles and post content to generate recommendations that are more tailored to individual users.
- Deep learning: Employing deep learning models, such as neural collaborative filtering or autoencoders, to learn more complex patterns in the interaction data.

By integrating machine learning methods into the recommender system, we can potentially improve its accuracy and generate more personalized recommendations for users. This would be particularly helpful in generating recommendations for new users, who do not have a significant number of interactions.

6.2 Results

At the time of writing this report, the recommendation system is not yet fully complete. The system currently implements a basic user-based collaborative filtering approach that generates friend recommendations based on the number of skills users have in common. However, there is still room for improvement and expansion.

As we have a time constraint, when considering potential improvements to the recommendation system, it is essential to analyze the cost in terms of development

effort against the expected performance improvement. This analysis will help guide the selection of enhancements that provide the greatest benefit while minimizing the required effort.

6.2.1 Evaluating Improvement Options

Each of the proposed enhancements offers different levels of complexity and potential performance gains. In order to determine the most suitable improvements, it is crucial to weigh the expected benefits against the associated development effort.

For instance, adding more interaction types may require relatively little effort and can provide immediate improvements in recommendation quality. On the other hand, incorporating machine learning techniques may require substantial effort and expertise, while the resulting performance gains may not be as significant or immediately visible.

6.2.2 Future Directions

The selection of improvements to the recommendation system will depend on which enhancements provide the most significant benefits with the least amount of effort, in order to maximize the overall effectiveness of the system.

As the development of the recommendation system progresses, we will continue to evaluate the available options and make informed decisions about which improvements to implement. This iterative process will help ensure that the recommendation system remains efficient at scale.

7. Conclusion and Future Work

7.1 Conclusion

In conclusion, the creation of an alumni portal for Habib University is a significant step forward in connecting past and present students, faculty, and staff. The portal serves as a platform for alumni to reconnect with each other and provide valuable advice to current students. It also allows students to seek guidance from experienced alumni, particularly in terms of career choices and educational pursuits.

This project is particularly significant because it is the first time that Habib University has had an alumni portal. This means that the portal fills an important gap in the university's offerings, providing a much-needed avenue for alumni engagement and networking. Moreover, the portal allows the administration to collect valuable data on alumni, including where they are working and studying. This data can be used to create success stories and showcase the university's achievements to prospective students and donors.

Overall, the alumni portal has the potential to be a valuable tool for both current and past members of the Habib University community. Its creation demonstrates the university's commitment to supporting its students beyond their time on campus, and its potential impact is significant. We look forward to seeing the connections, advice, and successes that will emerge through this new platform.
An admin dashboard is an essential tool for university administrators to gather, analyze, and interpret data related to their students and alumni. With the help of an admin dashboard, administrators can track students' academic and career progress, monitor their performance, and make data-driven decisions to improve their education system.

One of the key benefits of an admin dashboard is the ability to monitor where

students are studying and where they are working. This information can be used to identify trends and patterns, such as which industries or regions are popular among students, and tailor educational offerings accordingly. For example, if a large number of students are working in a particular field, the university may choose to offer more courses or resources in that area to meet the demand.

An admin dashboard can also help administrators keep track of which students are employed where and how many students from a specific batch and major are working or studying. This information can be useful for a range of purposes, such as tracking the success of graduates, monitoring the employment rate of different majors, and identifying potential areas for improvement in the curriculum or career services.

Additionally, an admin dashboard can help universities stay connected with their alumni network. By tracking where alumni are working and studying, universities can maintain relationships with former students and build a network of successful professionals who can mentor and support current students.
Overall, an admin dashboard is a powerful tool for university administrators to collect and analyze data related to their students and alumni. By leveraging this data, administrators can make informed decisions that can improve the educational experience for students, enhance their career prospects, and build strong relationships with alumni.

7.2 Future Work

- Alumni Mentoring Program: The university can add an alumni mentoring program to the website where alumni can register to become mentors for current students. The program can match mentors with mentees based on their interests, career goals, and other relevant factors. This program can help students gain valuable insights from experienced professionals and establish valuable connections in their field.

- Career Resource Center: The university can also add a career resource center to the alumni portal that provides a range of resources to help alumni and students develop their career skills. This resource center can include job search tools, resume and cover letter templates, interview tips, and other resources that can help students and alumni succeed in their job search.

- Career Resource Center: The university can also add a career resource center to the alumni portal that provides a range of resources to help alumni and students develop their career skills. This resource center can include job search tools, resume and cover letter templates, interview tips, and other resources that can help students and alumni succeed in their job search.

- Event Management System: The alumni portal can also include an event management system that enables alumni and students to connect with each other and attend events. The portal can include features such as event registration, RSVPs, event calendars, and notifications to ensure that alumni and students are up-to-date on upcoming events.

- Mobile Application: Once users increase, our main priority is to make a mobile application. It is difficult for people to stay up to date with the forum through a website where they can't receive notifications on their phone. Our goal is to make a mobile application which would allow the users to use the forum on their phones. This way, they would stay more connected with everyone, they will receive all the notification as well.

By implementing these new features, the alumni portal can become an even more valuable resource for alumni and students. These additions will help to facilitate mentorship, career development, community engagement, and networking opportunities for both current and past members of the university community.

Appendix A. Code

Our code can be found at `https://github.com/shayanshariff/hu-alumni-portal.git`.

References

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