Project Proposal

1. Project Title： EduRank Insights

2. Project Summary: It should be a 1-2 paragraph description of what your project is.

We aim to develop an information website focusing on global renowned university rankings, providing comprehensive and in-depth school information for students interested in higher education.

On this platform, students can view university rankings derived from the integration of multiple reliable lists, gaining detailed insights into university ranking information. Additionally, users can compare universities of interest, allowing them to understand the distinct advantages and differences in key metrics across various institutions. Furthermore, we plan to incorporate historical admissions data to offer users reference information for their applications.

3. Description of an application of your choice. State as clearly as possible what you want to do. What problem do you want to solve, etc.?

For students pursuing higher education, understanding a school's overall strength is really important. Apart from preconceived thoughts about institutions, individuals often rely on authoritative rankings to assess a school's comprehensive capabilities(e.g. US News, QS). However, existing reputable rankings in the market tend to emphasize different criteria, potentially resulting in limited utility for students seeking thorough insights.

In response to this challenge, our project aims to consolidate diverse ranking datasets, enhancing the value and depth of information available to students. By integrating rankings from diverse sources and employing data processing techniques, students can gain a more intuitive understanding of rankings tailored to their perspectives, aiding them in better planning their applications. We aim to utilize past admissions data based on standardized scores from reputable institutions to assist users in identifying areas for potential improvement. By comparing their current standardized scores with historical admission criteria at their preferred universities, we aspire that these features will aid students in their application processes.

4. What would be a good creative component that can improve the functionality of your application? To get a better sense of what a creative component, these are technically challenging features that helps shine your application. Some examples include interactive visualization (using several packages with some level or engineering), using several APIs to support some information presentation or using smart transformations to process data. Some examples that are NOT creative components include: software features that are completed with a few lines of code (i.e., adding a google maps iframe). Again, if you are unsure, discuss with your project TA

Our application plan to use the following components:

Data Transformation and Dynamic Interactive Visualization: Develop a system that transforms raw data into meaningful insights through automated feature extraction and real-time visual analytics. The system will identify key metrics (e.g., ranks, education expenditures, educational attainment) and present them through time series visualizations, network graphs, and interactive dashboards. By leveraging libraries such as D3.js and Plotly, the dashboards will enable users to explore large datasets dynamically, offering capabilities to zoom, filter, and drill down into specific trends or anomalies for deeper analysis.

Dynamic suggestions for users: It will provide users with personalized university recommendations based on a combination of their academic performance metrics such as GPA, SAT, ACT scores, and other relevant factors: Use the student's GPA, SAT, and ACT scores to match them with universities where they meet or exceed the typical admission criteria. Implementing a recommendation system to help students improve their GPA, SAT, and other academic metrics based on admission data. It will analyze historical data from students and provide personalized suggestions for academic improvement.

5. Usefulness. Explain as clearly as possible why your chosen application is useful. What are the basic functions of your web application? (What can users of this website do? Which simple and complex features are there?). Make sure to answer the following questions: Are there any similar websites/applications out there? If so, what are they, and how is yours different?

As higher education becomes increasingly important, choosing the right college has become a critical decision for many. To address this need, we have developed a web application designed to provide clear and comprehensive information to college applicants. Our platform has three main features:

- Comprehensive Rankings: Many global university rankings are released each year, and our app serves as an aggregator of these rankings. Users can view the latest composite rankings from multiple sources, which we continually update as new data is released. Users can also track the rankings of specific universities over time.
- Data Visualization and Comparison: Many applicants are interested in specific universities, so we provide detailed information for each institution. By collecting relevant data, our platform provides visualizations that help users compare schools. For example, if someone is interested in the University of Illinois at Urbana-Champaign, they can view data such as racial diversity percentages, admissions trends, and the number of Nobel Prize winners. Users can compare multiple universities side-by-side, making it easier to visually evaluate options.
- Recommendation System for Improvement Based on Student Profile: Our recommendation system allows users to enter their standardized scores, as well as select the schools they would like to attend, and we can recommend areas for improvement based on previous years' school performance admissions records. This makes it easy for users to quickly see what they need to do to get into the school of their choice.

The recommendation improvement system is the most complex feature of our application, as it requires integrating standardized scores from different universities and applying algorithms to provide users with areas to work on. The ranking aggregation and data comparison functions are relatively simple and mainly involve data processing and visualization.

Some existing websites, such as QS Top Universities, aggregate university rankings. However, our application has several unique advantages:

- Multiple rankings: We aggregate rankings from various sources, not just a single list.
- Interactive Visualization: Users can compare universities with detailed visualization of data.
- Recommendation Improvement System: We provide users with recommendations on what they still need to improve based on their standardized test scores and school choices, a feature lacking in similar platforms.

6. Realness. We want you to build a real application. So, make sure to locate real datasets. Describe your data sources (Where is the data from? In what format [csv, xls, txt,...], data size [cardinality and degree], what information does the data source capture?). It would be hard to satisfy stage 2 requirements with one dataset. Thus, we strongly recommend identifying at least two different data sources for your project.

We found three datasets listed below.
https://www.kaggle.com/code/gpreda/world-university-rankings-advanced-analysis/report
https://www.kaggle.com/code/yogesh239/analysis-of-university-admissions-data/input
https://github.com/deedy/gradcafe_data

The data sources for our project are obtained from Kaggle, which is a reliable platform for data science and computer science resources.
1.World University Rankings Advanced Analysis:
Source:This dataset can be accessed at Kaggle World University Rankings

Format: The data is provided in CSV format.

Data Size: This dataset contains approximately 1,000 records (universities) and 15 attributes (including features such as rank, university name, location, academic reputation, employer reputation, faculty/student ratio, citations per faculty, and international faculty/student ratio).

Information Captured: This dataset encompasses a comprehensive overview of world university rankings, detailing several critical attributes such as overall ranking, university name, country, quality of education scores, research influence metrics, citation counts, and various other factors that contribute to the university's ranking.

2.Analysis of University Admissions Data:
Source:This dataset can be accessed at Kaggle Admissions Data.

Format: The data is provided in CSV format.

Data Size: This dataset contains approximately 10,000 records (student applicants) and 12 attributes (including information such as GRE scores, TOEFL scores, university ratings, undergraduate GPA, admission decision, and other relevant features).

Information Captured: This dataset primarily focuses on university admissions and comprises important attributes such as admission criteria, acceptance rates, standardized test scores, GPA, demographic information of applicants, and other variables that influence the admissions process.

We have also found previous admission data related to standardized scores.
3. GradCafe admission Data
Source:The data is collected from TheGradCafe.com's results page, which includes user-submitted records of their application outcomes to various graduate programs.

Format:The data is provided in CSV format.

Data Size:This dataset contains tens of thousands of records, each representing an individual's application result. The exact number of records can vary based on the scraping frequency and existing data collected.Degree: Each record includes several attributes, such as:University Name,Program Name,Degree Type (e.g., Ph.D.,Master's) ,Application Season/Year,Decision (e.g., Accepted, Rejected, Interview)
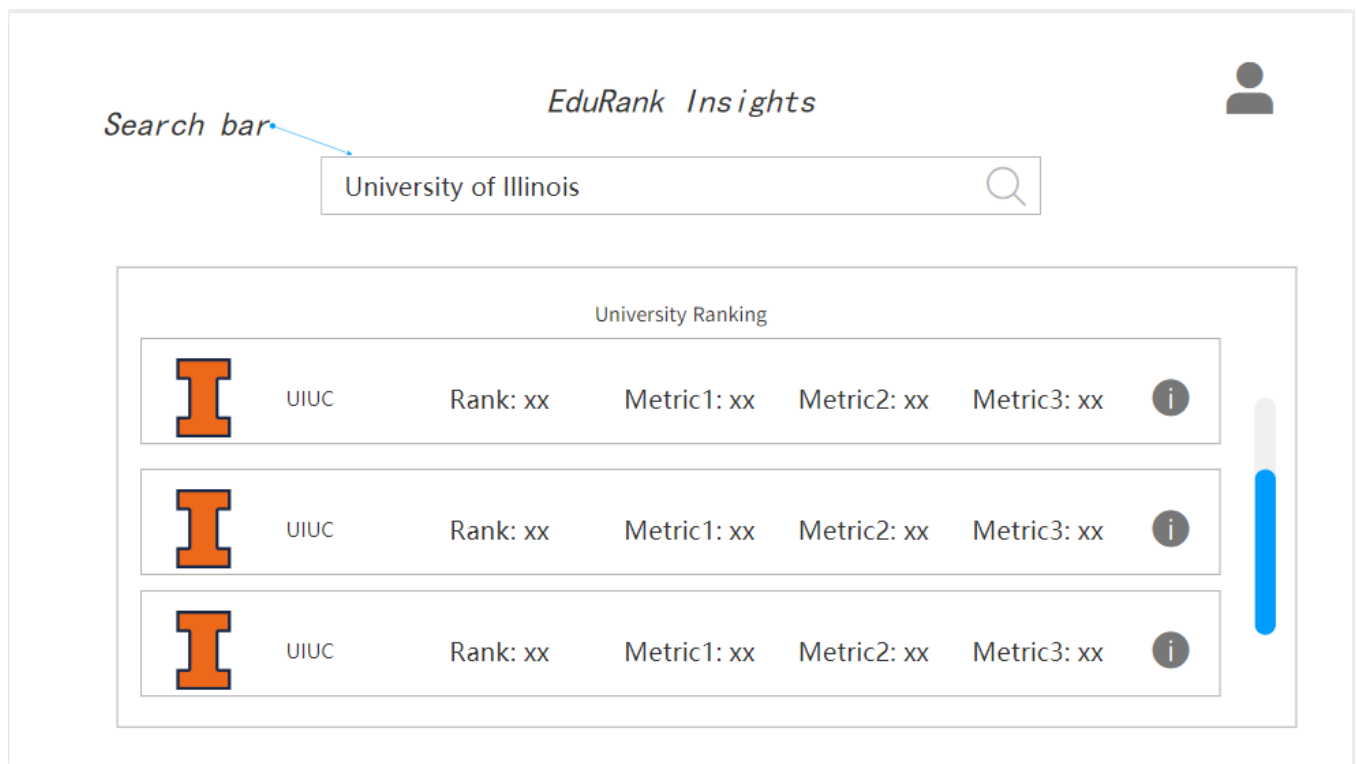Date of Notification,Method of Notification,Any additional comments provided by the user

Information Captured:The dataset captures information related to graduate school applications, including university and program names, outcomes of applications, the timeline of notifications, and subjective comments from applicants. This can provide insights into the competitiveness of different programs, trends in application results over time, and potentially the selection criteria of universities.

7. A detailed description of the functionality that your website offers. This is where you talk about what the website delivers. Talk about how a user would interact with the application (i.e., things that one could create, delete, update, or search for). Read the requirements for stage 4 to see what other functionalities you want to provide to the users. You should include:

1. **A low-fidelity UI mockup: What do you imagine your final application's interface might look like? A PowerPoint slide or a pencil sketch on a piece of paper works!**
2. **Project work distribution: Who will be responsible for each of the tasks or subtasks? Explain how backend systems will be distributed across members. Be as specific as possible as this could be part of the final peer evaluation metrics**

Our project basically includes three parts: ranking, comparison, and recommendation on improvement.

As for the ranking part, we plan to integrate data sources from different lists. Since the existing ranking from these lists may include some metrics that are irrelative to students, we will reference the metric data they provide to calculate the ranking. The filter will be provided to users so that they can choose freely which kind of metrics they really care. And then they can get the reliable ranking from their standpoints. We plan to list the ranking information and use some visualization tools to present the result vividly. Here are our UI mockup for home page and university ranking.
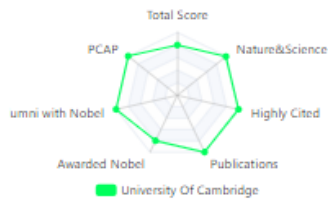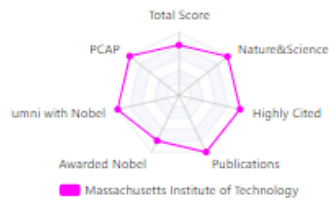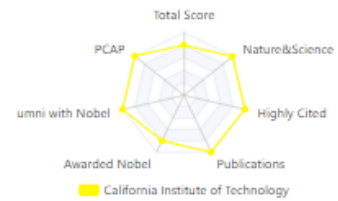
Search bar

World

Total Score
PCAP — Nature&Science
umni with Nobel — Highly Cited
Awarded Nobel — Publications
University Of Cambridge

Total Score
PCAP — Nature&Science
umni with Nobel — Highly Cited
Awarded Nobel — Publications
Massachusetts Institute of Technology

Total Score
PCAP — Nature&Science
umni with Nobel — Highly Cited
Awarded Nobel — Publications
California Institute of Technology

Total Score
PCAP — Nature&Science
umni with Nobel — Highly Cited
Awarded Nobel — Publications
Columbia University

Total Score
PCAP — Nature&Science
umni with Nobel — Highly Cited
Awarded Nobel — Publications
Princeton University
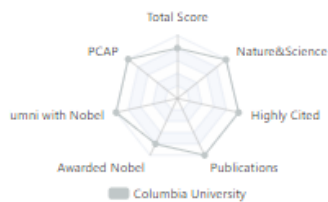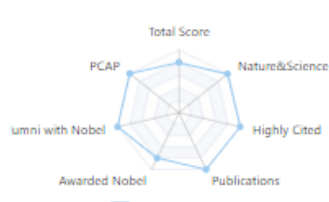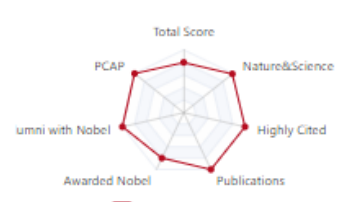
Total Score
PCAP — Nature&Science
umni with Nobel — Highly Cited
Awarded Nobel — Publications
University of Chicago

The comparison part will also be delivered to users. Users can collect universities that they care about, and use this functionality to see the differences between particular universities. Also, we will use visualization tools to point out the differences between universities. The UI mockups are listed below.

Collections

Add into camparison list

Compare(2)

UIUC ★ ⊖

Gatech ★ ⊖

Purdue ★ ⊕
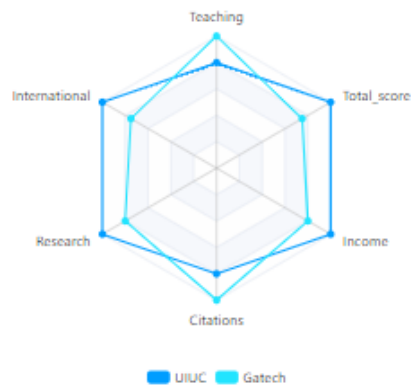
By ☐ Teaching ☐ International ☐ Research ☐ Citations ☐ Income ☐ Total_score   Line Chart   Radar Chart

In addition to all these functionalities, we design a suggestion system that can help students get to know which part of their standardized scores can be improved according to previous admission information. This part will tell users the degree of deviation from average value. The UI mockup is listed below.

← University of Illinois Urbana-Champaign

Illinois students, scholars, and alumni are a community with the power to change the world. With our land-grant heritage as a foundation, we pioneer innovative research that tackles global problems and expands the human experience. Our transformative learning experiences, in and out of the classroom, are designed to produce alumni who desire to make a significant, societal impact.eritage as a foundation, we pioneer innovative research that tackles global problems and expands the human experience. Our transformative learning experiences, in and out of the classroom

More Details

Please Type in your information to get a improvement recommendation

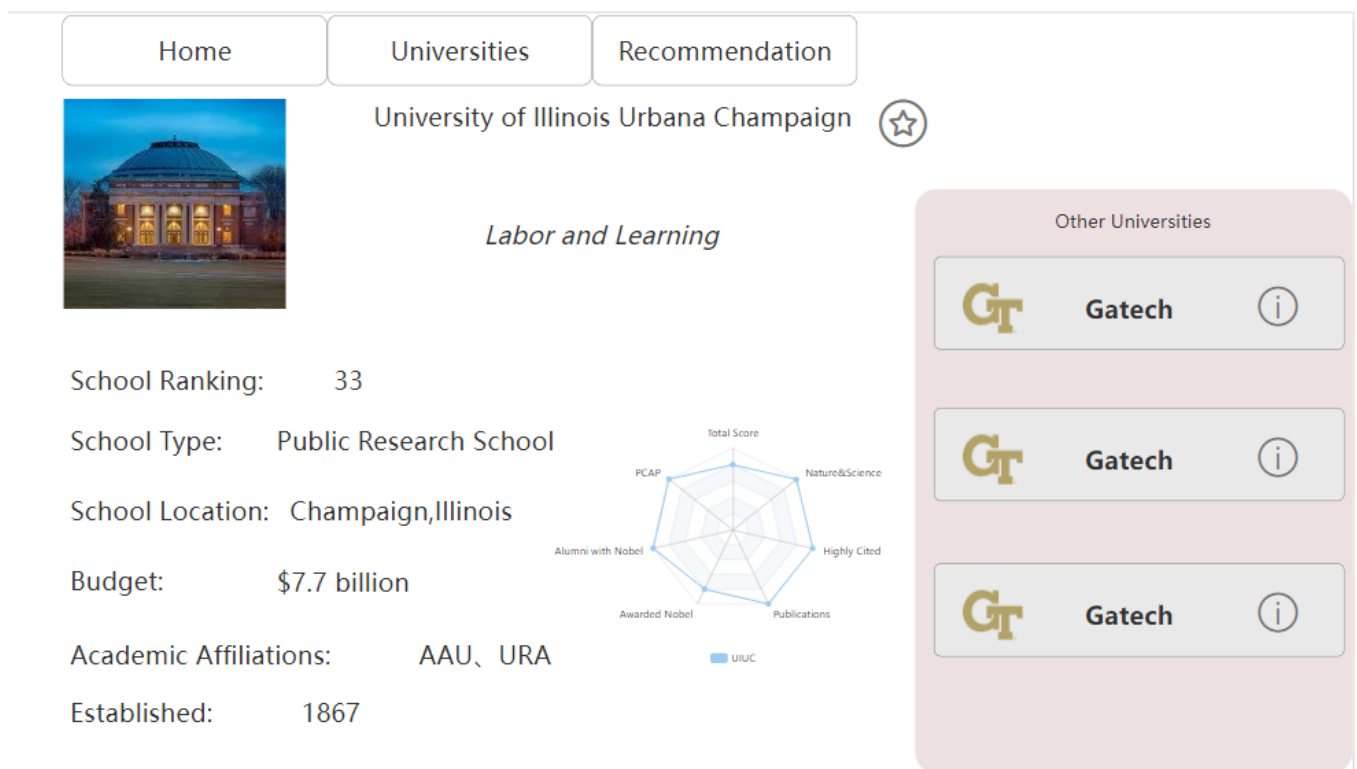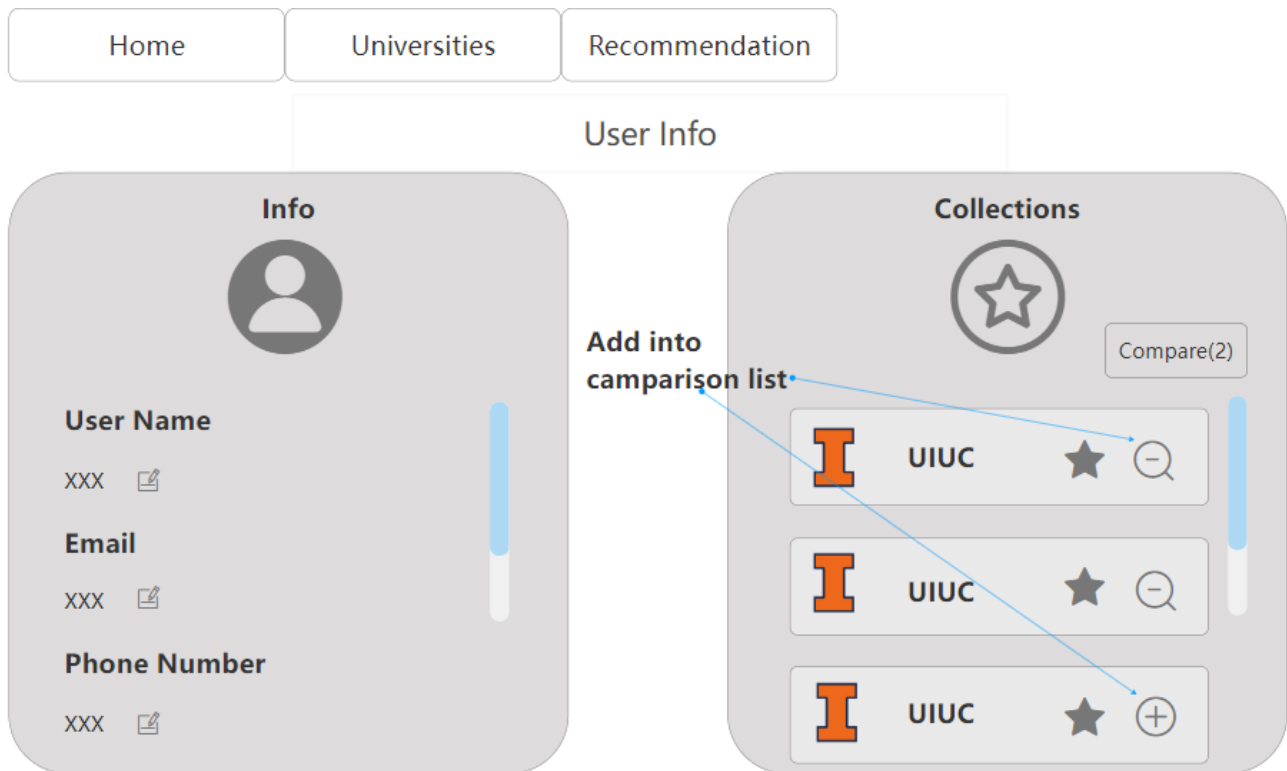|				
Current Degree:	High school diploma	Bachelor's degree	Graduate degree	Null
Graduate Year:	Graduation time
Basic Score:	TOFEL:	IELTS:	GPA:
Optional Score:	SAT:	GRE:	GMAT:	SUBIMT

We also design other other parts for this web application, such as the user info page, University information page.

As for the implementation of this web app. Firstly, the database design will be done by four members. Then for the data processing and loading task, Xingyuan Liu and Hongbin Yang will be responsible for the standardized score part, while the other two members will process the ranking data.

For implementation convenience, we plan to use a database deployed on the GCP, and Xingyuan Liu will be responsible for this part. Next, we will focus on the architecture design of backend system, to facilitate the process of development, we will use frameworks and tools like Springboot and Redis, and every team member will contribute to this part.

After the architecture design, we will start implementing CRUD functionalities. Given the requirement for advanced programming features such as transactions, triggers, constraints, and stored procedures, each team member

should design at least one of these features upon completing their part of the CRUD operations. Each member is responsible for completing the corresponding front-end pages for the CRUD functions they have implemented.

Update:

Based on the previous feedback, we have made some modifications to the functionality design of the project.

In order to enhance the interaction with users, we have decided to retain the university ranking feature and revise the section previously based on standardized scores recommendations to create a section for sharing admission information. Users can upload their application data and manage their personal uploads (edit and delete). Other users can search for historical admission data by school or program names to gain insights into applications. A simple UI design is provided as follows.

Admission Data

School

Admit Season

Program/Major

Degree Type

Notification

Notification Time

GPA   English Proficiency   GRE   Others

Notes

Submit

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search for institutions or program 🔍

UIUC MCS   Added on 03/21/2024

| Admitted | 3.90 | GRE 327 | 2 internships |

UIUC MCS   Added on 03/21/2024

| Admitted | 3.90 | GRE 327 | 2 internships |

In addition, to enhance user interaction with the project, we are considering adding a school review feature for users. Prospective applicants can use these various perspectives of evaluation (such as regarding living environment, school atmosphere, etc.) to filter out schools that are more suitable for them. This feature also includes basic CRUD operations for data and the related UI design is as follows.

For user-added ratings, we chose to allow users to submit their ratings for some of the features of the school. We provided them with five options: very satisfied, moderately satisfied, neither satisfied nor dissatisfied, moderately dissatisfied, very dissatisfied. Users could submit their ratings for the school by submitting their ratings. We will combine the User-id of the user and store the user rating in our database.

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Adding reviews toward University of Illinois Urbana–Champaign

What do you think of the living environment in school?
○ Very Satisfied   ○ Moderately Satisfied   ○ Neither Satisfied Nor Dissatisfied   ○ Moderately Dissatisfied   ○ Very Dissatisfied

What do you think of the learning atmosphere in school?
○ Very Satisfied   ○ Moderately Satisfied   ○ Neither Satisfied Nor Dissatisfied   ○ Moderately Dissatisfied   ○ Very Dissatisfied

What do you think of the libraries in school?
○ Very Satisfied   ○ Moderately Satisfied   ○ Neither Satisfied Nor Dissatisfied   ○ Moderately Dissatisfied   ○ Very Dissatisfied

What do you think of the dining halls in school?
○ Very Satisfied   ○ Moderately Satisfied   ○ Neither Satisfied Nor Dissatisfied   ○ Moderately Dissatisfied   ○ Very Dissatisfied

More thoughts?

Leave your comments here

SAVE

We also provide the option for users to manage their own reviews if they feel like doing so after adding them. They can delete and change the review content as long as they want.

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Current review   Delete your review 🗑

User Name	Living Environment	Learning Atmosphere	Libraries	Dining halls
User 001	Very Satisfied (5)	Neither Satisfied Nor Dissatisfied (3)	Very Satisfied (5)	Very Satisfied (5)
User 002	Very Satisfied (5)	Very Satisfied (5)	Very Dissatisfied (1)	Very Satisfied (5)
You	Very Dissatisfied (1)	Very Satisfied (5)	Very Satisfied (5)	Very Satisfied (5)
User 004	Very Satisfied (5)	Very Dissatisfied (1)	Very Dissatisfied (1)	Very Satisfied (5)
User 005	Very Satisfied (5)	Neither Satisfied Nor Dissatisfied (3)	Very Satisfied (5)	Neither Satisfied Nor Dissatisfied (3)

User can also search for such reviews. They can get to know the statistic values via searching, and they can get detailed information(such as comments) if they want.

Search Reviews toward University of Illinois Urbana Champaign 🔍

Living Environment ℹ   Added on 03/21/2024

Satified:63%	Moderately Satisfied:15%	Dissatisfied:22%

Dinning Halls ℹ   Added on 03/21/2024

Satified:63%	Moderately Satisfied:15%	Dissatisfied:22%

Engineering Libraries ℹ   Added on 03/21/2024

Satified:63%	Moderately Satisfied:15%	Dissatisfied:22%

The overall CRUD functionalities are listed below.

Create:
Administrators can insert school information (basic information, metric information).
Users can share their historical application results.
Users can post comments about schools.
Users can add a school to their favorites.

Read:
Users can check school rankings and choose different filters to get different results.
Users can look up historical application information for specific programs.
Users can compare data between schools (requires prior favoriting).

Update：
Administrators can update school information (description, metrics).
Users can edit their historical application results.
Users can edit their comments.

Delete：
Administrators can delete school information.
Administrators/Users can delete shared historical application results.
Administrators/Users can delete comments.
Users can remove their favorites.