GraduAid

CS194 Project Proposal

Team Nogada

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Abstract

Stanford students have to juggle multiple tools such as Axess, Explore Courses, Excel 4-Year Plans, and Program Sheets in order to fully plan out their quarters in advance with appropriate graduation requirements. We wish to consolidate the different resources into a single platform for easy tracking and updating of the degree progress, allowing users of GraduAid to not only avoid unnecessary confusion, but also save time in creating their ideal 4-year plans.

Description of the Project

Our project GraduAid is a web application that helps Stanford students keep track of which graduation and major requirements they have fulfilled, identify ones they need to take within their specific concentration and discover potential courses they could take to meet the requirements. The specifics of graduation requirements are very different for each major and concentration, so we will focus on the Engineering undergraduate degrees first, and then gradually extend to other majors.

From users' perspective, GraduAid has a multi-step onboarding process that begins with creating a profile with basic information such as name, graduation date and major. Next, they will identify the details of his degree, such as concentration (i.e. Human Computer Interaction, Systems, Artificial Intelligence). The final step would be users documenting all the classes they have already taken within different areas such as core, depth and electives. To make the process easy, writing down all the courses will most likely be in multiple choice form depending on the track they choose.

Once all the information is recorded, users can use various functions to plan their quarter schedules. Some functionalities may include:

- See what requirements they are missing and how many more units they need within core, depth and electives
- Check how much progress you have made overall
- Show a list of classes that you could take to fulfill the missing requirements
- Check your major GPA and cumulative GPA

Overall, our aim with GraduAid is to provide a platform for easier tracking of numerous graduation requirements and planning for optimal future quarter schedules.

Need for the Product

There are many requirements that need to be fulfilled to graduate Stanford University. For the common requirements everyone must fulfill, we have Undergraduate Writing Requirements, Language Requirements, Thinking Matters, and Ways of Thinking/Ways of Doing. On top of the common requirements, we each have distinct major requirements that we must also fulfill to graduate. Axess shows the degree progress report, but it is very limited, because it only shows the progress on the general requirements and not the major requirements. To check upon the full degree progress including the core major classes and electives, students must manually go through the program sheets provided by each department, handwrite the plans for the classes, and constantly go back and forth to Stanford Explore Courses to read the class description and decide whether to take the class or not. For a university renowned for the talented computer science skills, having to repeatedly go through Excel sheets is surprising.

Students need a better platform to see how far they are into graduation, and what more they need to fulfill. Currently, the resources are scattered across to Axess, Explore Courses, Stanford Undergraduate Handbook, and Excel program sheets. After declaring a major, students are given the option to choose from numerous tracks to focus their studies, but it is not clear how one track is different from another. If students took major classes without a specific track in mind, and later on wanted to find out what track fit them the most, the only option they currently have is to go through the entire program sheet for the major and one-by-one create a manual checklist to see how far they are into each track. If they took more classes later on, they would have to go through the entire process again. If there were an automated platform that could keep this list up-to-date, and also show the degree progress for all the possible tracks, then students could better decide which track to focus early on.

In addition, current system is slightly limited in showing how students are performing academically. We have the access to our transcripts, but they only show the current quarter and the overall GPA. To get the major GPA, students must match their past previous classes in the program sheets and calculate the GPA with the corresponding unit counts. This project will save students time and efforts to track their progress.

Potential Audience

We have performed a small survey to our potential users by asking Stanford undergraduate students what they thought about our project. Everyone responded positively, and strongly encouraged us to pursue with the project. They all shared common difficulties of going back and forth on Axess, Explore Courses, and Excel program sheets that they wanted a single, unified platform that provided these services. When our product goes live, we expect all of the undergraduates majoring in Engineering, or anyone who want to see how far they have progressed in a specific track in Engineering, but do not have the time or resources to do the calculation themselves, to be eager to use this product. There is not a platform yet that provides a concrete, complete degree progress analysis for each track. As this platform would provide such analysis not only for a single track, but also for all tracks to easily compare, our team expects all of the Engineering majors to find value in using this product.

In addition, we expect the undeclared freshmen and sophomores considering Engineering as a potential major to be willing to use the project. As they are students who have recently arrived to the Stanford community and have a lot to learn and be accustomed, it is difficult for them to plan their future academic quarters without a unified platform that provides clear guidelines and goals that are needed to pursue a track in Engineering. This product could reduce much of the workload and pressure off of their shoulders. Therefore, we expect this product to be widespread not only amongst the students majoring in Engineering, but also the undeclared freshmen, sophomores, and prospective Engineering majors.

Should our project expand to cover all majors provided to Stanford undergraduates, our team expects the potential users to be the entire Stanford undergraduate community. Based on our learnings from need-finding, we found out that a number of undergraduate students at Stanford are already experiencing stress by the lack of the unified platform to gauge their degree progress. If this project can expand beyond the scope of Engineering majors, then we expect the potential audience to be the entire Stanford undergraduates.

In terms of technical sophistication, Stanford students are very proficient in using technology. As people who in the heart of silicon valley and are exposed to the numerous and ever-changing technologies, we find that our audience will not have much trouble interacting with our product as long as the workflow of our website mirrors the structure of the currently trending websites.

Discussion of Competing Products

When it comes to class selection and course scheduling for major requirements, most Stanford students rely on creating their own Excel spreadsheets and painstakingly looking back and forth explorecourses.com course descriptions and their major spreadsheet. There is no product or a platform that integrates the major requirements and the current progress of an individual student.

As mentioned before, Axess provides 'Department Degree Progress Report' which checks whether a student has fulfilled each general requirement. However, as *Figure 4.1* shows, this report is only limited to monitoring the general requirements which every undergraduate student at Stanford needs to fulfill, without any respect to individual major requirements. Furthermore, the report does not provide any recommendations of classes to fulfill the requirement he or she is lacking, forcing the student to search for classes on his own.

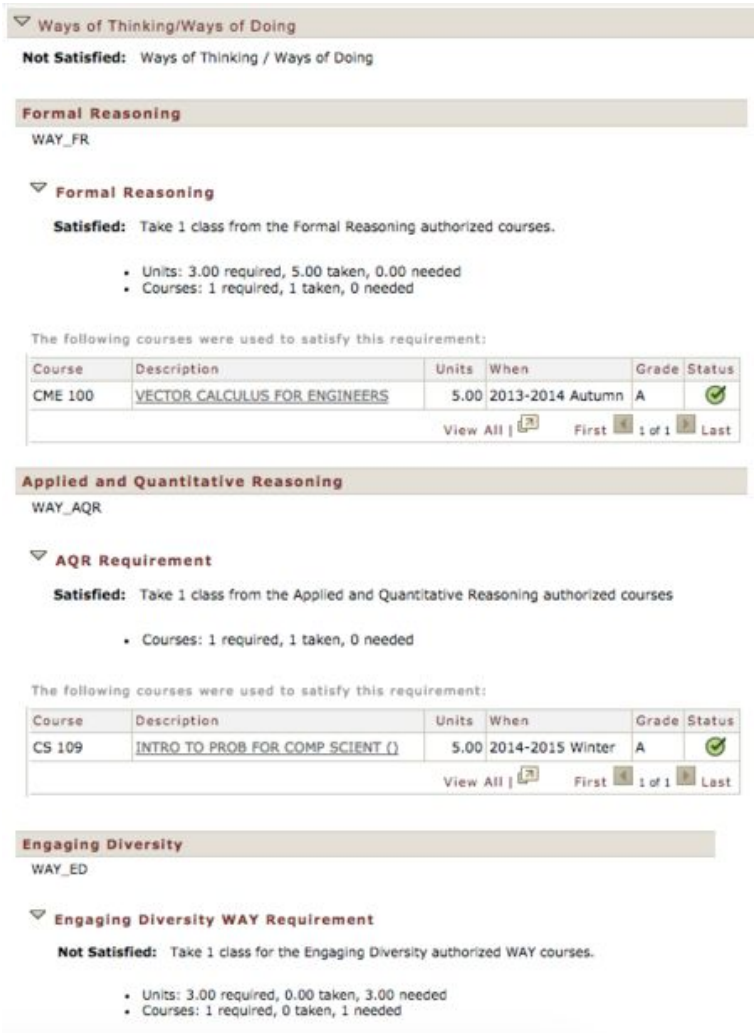

Figure 4.1 Axess Degree Progress Report of a current student

Additionally, there exists numerous websites for Stanford students that provide course descriptions, real student reviews, and cumulative grade distribution. These websites, including CourseCycle, Edusalsa, and TreeViews have the same focus - they concentrate on providing information of each class. However, our product GraduAid focuses on exploring different majors rather than individual classes. We plan to concentrate on creating a bigger picture and leading each student to examine diverse majors given classes he or she has taken so far.

Major Technologies Used

- Programming language: We will develop a web application, so we will mainly use HTML, CSS, and JavaScript to render web pages for clients. For server-side, we will deploy Node.js as our main framework, so JavaScript will be our main programming language.
- Web server: Since we are building a web application, we definitely need a web server to run our application. There are many open sources such as Amazon AWS, and we plan to use one of them.
- Database: Currently, we are thinking of integrating our database into the main web server as we expect that there will be relatively small amounts of data to be stored in the database. However, it is possible that we may need a separate database server if the total amount of data becomes larger. In this case, we plan to use open sources like Amazon AWS.
- Development framework: We will use Node.js as our main framework. More specifically, advanced frameworks optimized for web applications will be deployed, such as AngularJS and ExpressJS, which are built top of Node.js.
- Version control systems: We will use GitHub and integrate SourceTree with it. GitHub is a widely utilized version control system, and SourceTree provides GUI and easy interface to use.
- Course information API: We need to fetch information of all courses for our project, and thankfully, there exists an open API to access course database, provided by Jim Sproch. (http://explorecourses.stanford.edu/instructor/jsproch)

Resource Requirements

As mentioned in above, we need a web server to run our application. We plan to use one of many open sources, including Amazon AWS. Also, we need a permission from the author of course data API to use freely in our application.

Potential Approaches

The main goal of our product is to provide students with a unified online platform to track their academic degree progress. Amongst many options provided, we decided to focus on online web platform after we analyzed the pros and cons of different platforms and methods.

Our team decided to favor the web platform over the mobile platform because when students plan their future courses, they normally do so with multiple tabs and online resources open on their computer screens. They need to look into many materials, such as their transcripts, excel sheet, and their previous plans that require their working in a screen bigger than their hand-held mobile phones. Mobile platforms do have their advantages, such as its unrestricted access regardless of time and location, but we believe the current needs are better satisfied through an online platform.

The problem area our team addresses is that apart from the common academic requirement progress, students are not provided with a thorough degree progress report that includes their major core classes. Our answer to this problem is to provide a unified platform that assesses degree progress for different tracks under the Engineering major. There may be other possible answers, such as hosting info sessions to inform students about different tracks available, distributing a simpler Stanford Undergraduate Handbook to all undergraduates, or leaving it up to the freedom of students to use Excel program sheets. However, our team believes providing the online platform is the most appropriate answer to the problem, because students are given too much information that is up to them to organize and digest. To organize their time and resources more efficiently, students should be given a choice to use the online platform without time or location restriction, which is difficult to achieve using info sessions, handbooks, and program sheets.

Also, after much consideration our team decided to remove the recommendation functionality from our product. We planned to provide a list of recommended courses based on the previous courses taken, but we fear this might restrict students' will to take courses they are interested in favor for those that are merely more popular. We want this product to be used to provide a clearer guideline for students to seek for themselves, not for them to follow others' footsteps. Therefore, our team's product will focus on providing a comprehensive up-to-date degree progress for different tracks under Engineering major, but not the recommended courses to take in the future.

Assessment of Risks

- Limiting students' scope of exploration: By providing which courses to take in order to fulfill graduation requirement, GraduAid risks inhibiting students from exploring more courses and encouraging students to only focus on taking major-related courses. However, we plan to only provide suggestions based on the objective facts - courses that need to be taken based on the courses a student has taken so far in order to pursue a selected major, rather than recommending what classes are good to take.
- Excessively focusing on major GPA: By providing current major GPA's for each major based on classes one has taken, users of GraduAid might decide his or her major to be the one that yields the highest major GPA at the given time. However, we think this risk is trivial, as most students tend to excel in classes they are particularly interested, which usually lead to major choice as well.
- Having to frequently update their coursework information: In order for the functionalities on the website to work correctly, the user has to be diligent about updating his information regarding the most recent courses he took. If the user finds this process to be difficult or annoying in any way, GraduAid will lose its appeal. This is an important risk, which is why we will carefully design the workflow of the website to minimize different pain-points of manual update, such as using multiple choices rather than fill-ins and making the UI very clear on what the input has to be.

Next Steps

In order to build our product, we have identified some next steps:

1. Set up the basic web server and integrate version control system into it.
2. Install development framework on the web server.
3. Design and implement the basic data structures of application. (e.g. user, course, track)
4. Fetch data from course API and import some sample program sheets to test and improve interfaces developed until this point.
5. Test and improve the interface and design flow chart of the application.
6. Design and implement each web page to clearly display information to clients.
7. Complete the application by adding specific features such as a log-in system.