Lab 1 – Monarch Course Explorer

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1 Introduction

Monarch Course Explorer is an academic tool used in assisting faculty and students in making the correct choices in their academic schedule. Being a student can bring many challenges when considering other important obligations. These obligations include work, family, as well as finances. The previously listed obligations take away the great experience of the full-time college student dynamic. Those who attempt to balance these obligations (including a college education) can be extremely overwhelmed. This constant state of being overwhelmed can lead to intense burn-out. Burn-out is a syndrome resulting from chronic stress that has not been successfully managed. The burn-out syndrome can cause students to feel depressed and unmotivated to finish their academic studies at Old Dominion University. The effect of these feelings can lead to students dropping out due to the unnecessary pressure of an imbalanced schedule.

1.1 Problem Statement

Managing a full-time job, being a student, and taking care of oneself can be stressful. The lack of control and time one can have for themselves can contribute to mental health issues such as depression or anxiety. High levels of stress can hurt the mental health of individuals. Across America college students are experiencing serious psychological distress. According to bestcolleges.com, “In 2022, over three-quarters of college students (77%) experienced moderate to serious psychological distress” (Bryant, Welding). When focusing on reducing the stress of the students, focus should be brought to the idea of in-depth class knowledge and schedule customization.

1.2 Problem Characteristics

Old Dominion University and other colleges are lacking a platform that can integrate students and faculty. Students need a platform that helps them create a more thorough, well managed, adaptable, and effective learning experience. The lack of communication between professors’ point of view and students’ point of view leads to negative feedback for faculty. This disconnection between faculty and students also gives bad outcomes for students. Faculty at Old Dominion University are limited in the feedback received from students. The faculty on the curriculum committees spend a large amount of time evaluating syllabi ensuring they meet the ABET accreditation standards. Advisors are overworked and lack in-depth information on the classes students are requesting to be advised in. Students at Old Dominion University do not have enough information to decide what or how to take their classes for the upcoming semester. Working students do not have a more effective way of choosing classes that align with their lifestyle. Often, it is stressful for students to have to make lifestyle changes at the last minute because of lack of knowledge. When students must make last minute lifestyle changes, it can cause rushed and irrational decision making. This can cause students to accidentally select

classes that are unable to align with their lifestyle. The ramifications of this selection can include wasting money spent on tuition, possibly increasing his amount of student debt, delaying graduation, or even dropping out of college.

1.3 Solution Statement

Monarch Course Explorer (M.C.E) is a moderated review platform where students can view syllabi from Old Dominion University courses. This review platform will provide a way for students to give and view feedback about their courses. Students will also be able to view automatic comparisons between semesters and between teachers. M.C.E plans to serve as an add on to advising services at Old Dominion University. The view and leave feedback feature can aid advisors in helping students select better choices for uncertain class selections. This platform allows advisors to access course syllabi for better advising assistance to students. The syllabi will be confirmed by the undergraduate curriculum committee members on M.C.E. Our goal is to make the committee member approval process easier, in return the product will have validated syllabi presented on the website. M.C.E wants to act as a one stop shop for students, advisors, professors, and undergraduate curriculum committee members.

1.4 Solution Characteristics

Students can provide and view constructive feedback about their previous or future courses. This feedback can be viewed and provided depending on semester and faculty. Students at Old Dominion University can also make their educational experience customizable. This ensures the student can anticipate rough semesters and plan for better options if available. If better options are not available, the student is able to adjust their personal life ahead of time to better anticipate for the challenging semester ahead. Monarch Course Explorer gives faculty the ability to view and comment on the feedback given by students. Staff such as professors can access their reviews, obtain feedback, and make course adjustments if needed. Old Dominion University faculty that can utilize Monarch Course Explorer include professors, advisors, and undergraduate curriculum committee members. Here is a further list of features offered by this moderated platform: filter and compare syllabi based on attributes, collect syllabi from professors, provides student and faculty detailed feedback for a given course, assists syllabi evaluations for Curriculum Committees, and preforms integrity checks on given feedback.

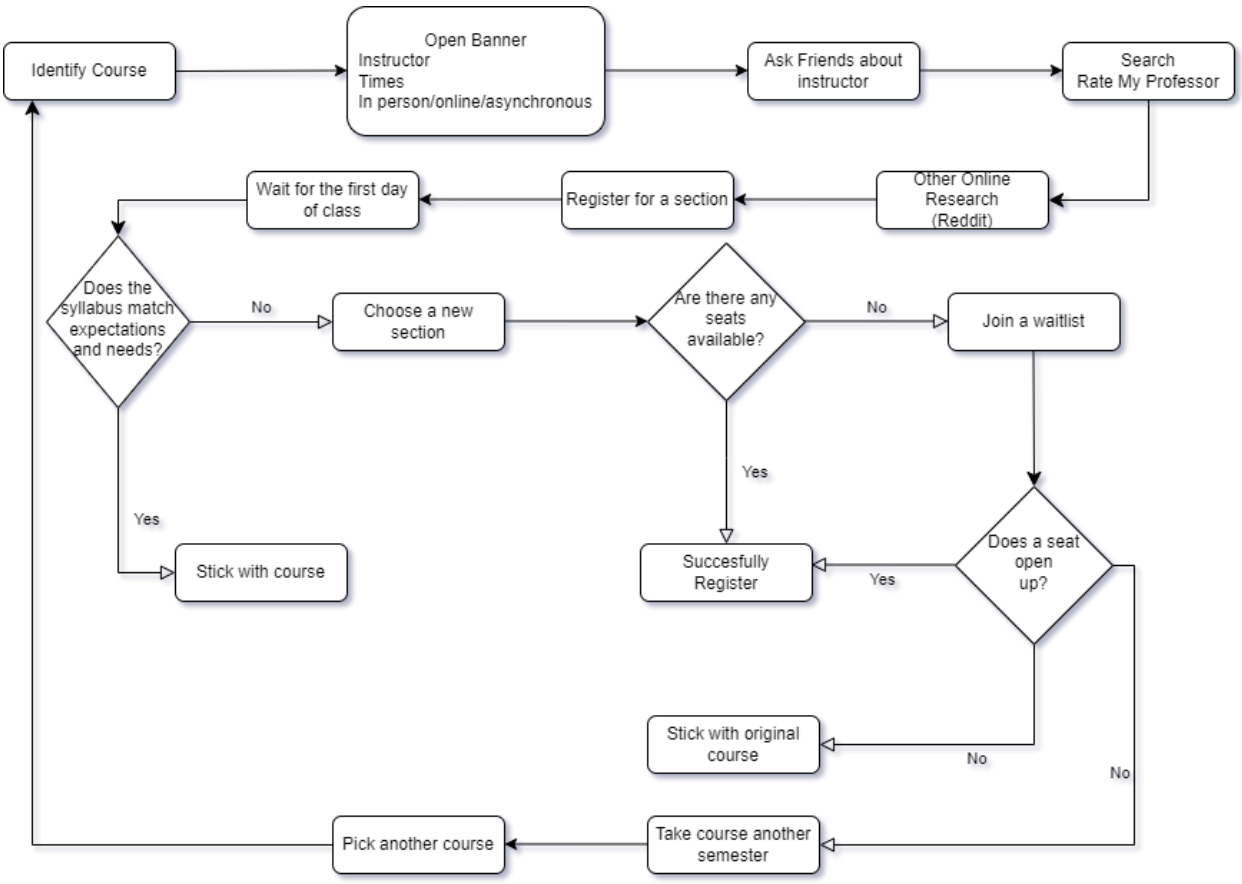

Figure 1: Current Process Flow (Student Perspective)

Figure 1: Current Process Flow (Student Perspective) Description:

The figure above shows the current process flow for students. This process flow exhibits the current system at Old Dominion University. First the student identifies the needed course. After, the student opens Banner to look at the needed course. Banner holds the information of the class such as the instructor, times and if the course if in person, online, or both (asynchronous). Commonly, students find out about the course by word of mouth by other students. After asking peers for a review the student then begins to do research online for a second opinion. Online research includes Rate My Professor or Reddit. After the research is concluded the student will make their decision. The student will not be able to decide if the course will work for them until the first few days of the course. The student will check the personality of the professor, lecture hosting, grading and attendance requirements. If the conditions do not align with the student's needs and expectations, the student must choose a new section if seating is available. If seating is available, the student can register for the course. If seating is not available, the student must join the waitlist. With this option the student can risk being stuck in the class. The last option is taking another course. Starting this process over again.

2 Product Description

Monarch Course Explorer (M.C.E) is a moderated platform where faculty and students can view and approve of syllabi. The product will be moderated with MIDAS, Old Dominion's authentication system. To ensure the integrity of the website, users can rate feedback. Low quality feedback is removed, to keep the space trustworthy. Faculty also could leave feedback to inform or comment on the review. Students can view and offer feedback about their courses. In the viewing feature M.C.E offers automatic comparisons between semesters and professors. This product will serve as a supplement for advising services at Old Dominion University. It will allow advisors to access course syllabi and reviews to better assist students. This website will filter and compare syllabi to better assist students and advisors in course choice evaluation. Monarch Course Explorer will collect syllabi from professors and assist the syllabi committee. The goal of this website is to provide students and faculty with more detailed feedback from previous courses.

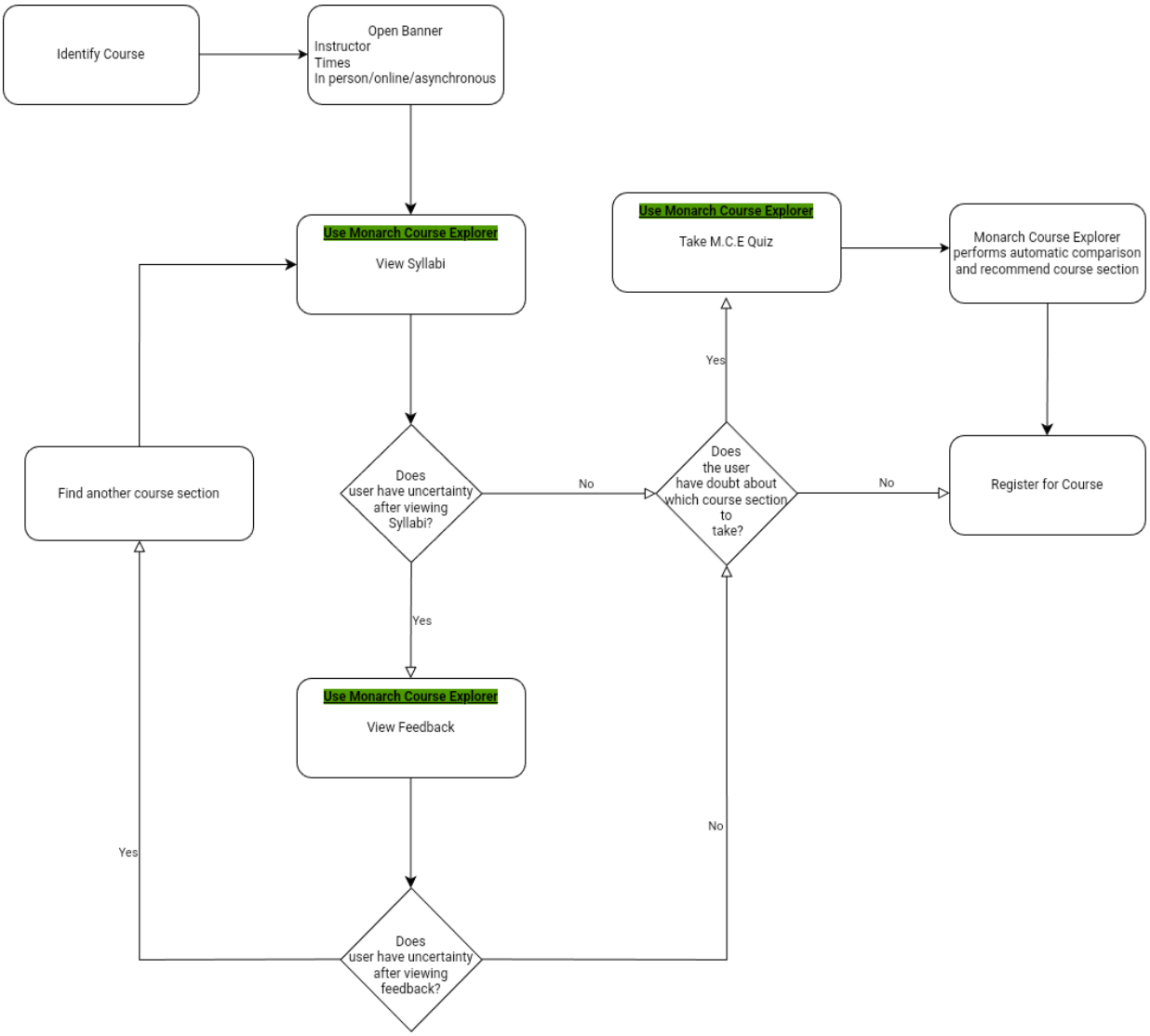

Figure 2: Proposed Solution Flow

Figure 2 Description:
The user will identify the desired course. Next, user will open Banner to choose the instructor, time of class, and class type. When using Monarch Course Explorer, the user will have the ability to view the syllabi. If the user has no uncertainty or doubt in the course section, they can confidently register for the course. After viewing the syllabi, if the user is not certain in the class selection, the user can view the feedback. The feedback of the course is left by previous students from previous semesters. If the user is still uncertain, they can find another course section. If the user is certain but still confused on which course section to take, the M.C.E Quiz is available. The quiz will allow user to select which course will be best for the user. The Monarch Course Explorer Quiz performs automatic comparison and recommend the best course selection. After the quiz, user is confidently able to register for their course if available.

2.1. Key Product Features and Capabilities

Monarch Course Explorer offers access to syllabi and syllabi comparisons. Verified Old Dominion University students can provide feedback on courses. Students and faculty can view feedback to assist in course selection. This feature aids students and advisors in the ability to customize the student's academic schedule to fit their learning style and lifestyle. A positive attribute to the review feature is the fast feedback professors receive on their class. This gives the professors the ability to make the proper adjustments to the course in a timely manner. Another feature goal of this product is to assist the review committee with evaluating and approving of course syllabi. A unique trait of this product is the amount of comprehensive course information. Students and advisors no longer must check multiple sources to obtain information on a course. The automatic comparations between semesters or faculty makes selecting classes and decision more efficient. M.C.E is MIDAS authenticated allowing this tool to be exclusive to Old Dominion University. This exclusive tool can separate Old Dominion from the rest of the University competition.

2.2. Major Components (Hardware/Software)

On the front end, users can view syllabi, compare syllabi, and view feedback. Other features such as uploading syllabi, giving feedback, and reporting feedback will require users to sign in. On the backend, syllabi will be scraped, normalized, analyzed, and stored in a database. Users will be authenticated with their MIDAS information for identity verification.
The languages used to contribute to the website will be HTML, CSS, and JavaScript. HTML is used to assist with the user display. CSS will assist in the formatting and design of Monarch Course Explorer. JavaScript enables user interaction. JavaScript allows the user to participate in quizzes and course selection.
Python is the second language being used analyzing the proper data for Monarch Course Explorer. Beautiful Soup is used for web scraping the syllabi. Natural Language Processing assisted with SpaCy will be used to transform the scrapped language to the course selection website. Django will assist in creating multiple web pages to allow the free functionality of the software.
Database assistance will be handled by PostgreSQL because of its high data consistency, integrity and versatility. MIDAS is used to verify student, staff service and identity. This will authenticate the user to prevent non-ODU affiliated members from accessing the site.

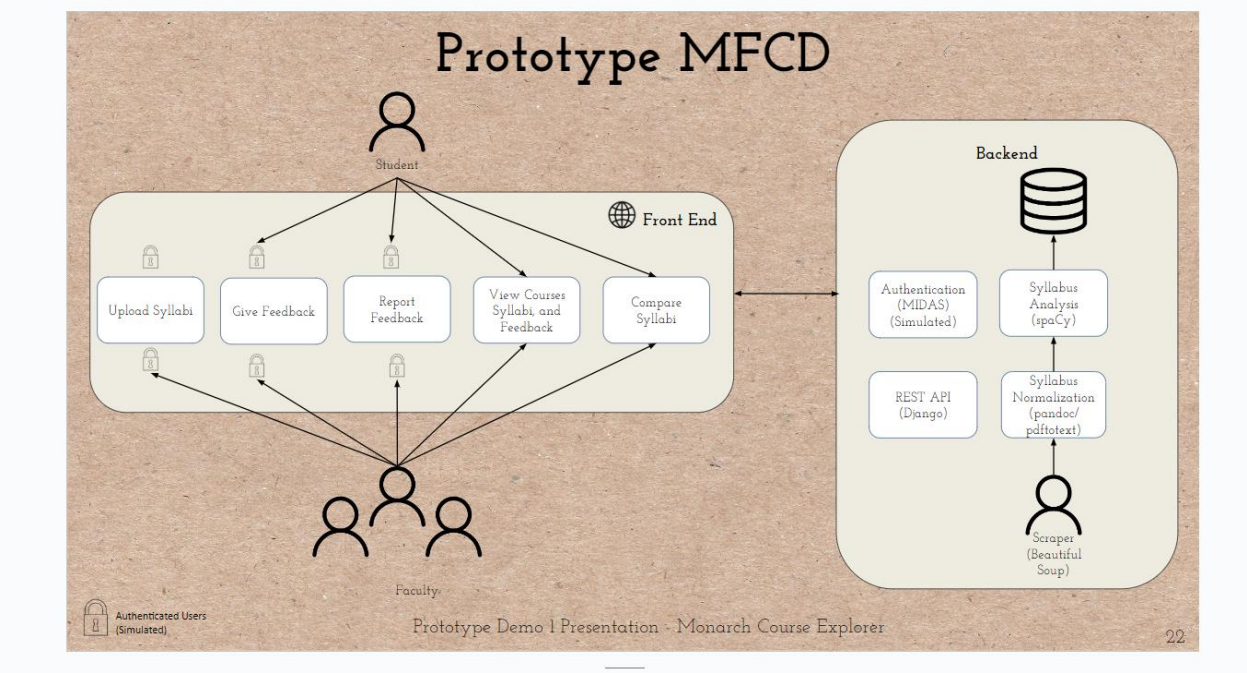

Figure 3: Major Functional Component Diagram

Figure 3 Description Major Functional Component Diagram:
The student and faculty front end can view courses, syllabi (for comparison), and feedback. The syllabi are posted after review once users sign in. Other features available to users who sign in are the ability to give feedback and report feedback for review and deletion. On the backend of Monarch Course Explorer, MIDAS is being used for authentication. Django will be used for the Rest API and Beautiful Soup for syllabi scrapping. SpaCy will be used in the analysis of the desired syllabi.

3. Identification of Case Study

Old Dominion University will be the case study of our product. Old Dominion offers a diverse student population. Included in this population are traditional and non-traditional students. Traditional includes the group of students who only must focus on their college education. Non-traditional students include students who must worry about their jobs, families and other priorities before college. In this case study there are online students, in-person students, long distance, off campus and on campus students. The faculty of the university can be understaffed at times in the professor, advisor and curriculum committee positions. Not only can this product contribute to the student population but the staff population as well. Monarch Course Explorer has universal capabilities. Other universities and institutions can utilize this program to assist faculty and students in making a more refined, robust collegiate program.

4. Product Prototype Description

Monarch Course Explorer prototype will be able to upload, scrape and view syllabi. The prototype also has the partial ability to analyze syllabi in different formats. For the class section features of the prototype there will be verified inclusion of required sections. The verification will be completed by the syllabi committee. There will be a report given from the verification analysis of the syllabi committee that will list the missing sections so the staff can review and edit the syllabi. If the sections are not added, it will be noted that they are not included on the syllabi. The prototype will also filter and compare the class sections syllabi, for efficient decision making for the users inquiring about the course. Monarch Course Explorer prototype feedback feature allows the user to view, rate and provide feedback for the course sections they have taken. The authentication part of this prototype can be partially implemented. This is partially implemented because MIDAS is a secure authentication system already being utilized at Old Dominion University. The university is unable to disclose the full information of the authentication system without putting the university at an IT risk. The Monarch Course Explorer quiz and course recommendation will have full user implementation in the prototype.

Features	Student	Faculty: Professor	Faculty: Advisor	Faculty: Curriculum Committee Member	Real World Product	Prototype
Upload Syllabi		✓		✓	✓	✓
Scrape Syllabi		✓		✓	✓	✓
View Syllabi	✓	✓	✓	✓	✓	✓
Side-By-Side View	✓	✓	✓	✓	✓	✓
Analyze Syllabi in Different Formats					✓	Partial

Table 1: Features and Functionality of Syllabi

Table 1: Features and Functionality Description
Monarch Course Explorer prototype will be able to upload, scrape and view syllabi. Prototype gives partial ability to analyze syllabi in different formats. The student section shows what features the students can use. Faculty: Professor shows what features are available to the professors. Faculty: Curriculum Committee Member shows what features are available to the

Curriculum Committee Members. The last two column compares what the prototype is expected to feature compared to the real-world product.

Features	Student	Faculty: Professor	Faculty: Advisors	Faculty: Curriculum Committee Member	Real World Product	Prototype
Verify Inclusion of Required Sections				✓	✓	✓
View Report of Missing Sections				✓	✓	✓
Fitler by Sections	✓		✓	✓	✓	✓
Compare sections	✓		✓	✓	✓	✓

Table 2: Features and Functionality of Syllabi

Table 2: Features and Functionality of Syllabi Description
The verification of syllabi will be completed by the Curriculum Committee Members. There will be a report given from the verification analysis from the members of the Curriculum Committee that will list the missing sections so the staff can review and edit the syllabi. Students and advisors can filter and compare the class sections syllabi.

Features	Student	Faculty: Professor	Faculty: Advisor	Faculty: Curriculum Committee Member	Real World Product	Prototype
View Feedback	✓	✓	✓		✓	✓
Rate Feedback	✓	✓			✓	✓
Provide Feedback	✓	✓			✓	✓
Filter Feedback by Semester	✓	✓	✓		✓	✓

Table 3: Features and Functionality of Feedback

Table 3: Features and Functionality of Feedback Description
Monarch Course Explorer prototype feedback feature allows the user to view, rate and provide feedback for the course sections they have taken. The student, professor and advisors can view and filter feedback by semester. Only students and professors can rate and provide actual feedback on their courses.

Features	Student	Faculty: Professor	Faculty: Advisor	Faculty: Curriculum Committee Member	Real World Product	Prototype
Authentication	✓	✓	✓	✓	✓	Partial
Take Quiz	✓				✓	✓
View Course Recommendation	✓				✓	✓

Table 4: Features and Functionality of Other

Table 4: Features and Functionality of Other Description
MIDAS authentication will be partially implemented but is expected to be required for the student, professor, advisor, and members of the Curriculum Committee. Students will be able to take the quiz and obtain course recommendations from the quiz results.

4.1. Prototype Functional Objectives

The prototype is expected to scrape and verify inclusion of required sections on the syllabi. With the help of the curriculum committee, a report of missing syllabi sections will be generated. The syllabi feature will be filtered and compared by section. The feedback feature of the prototype will include view, rate, provide and filter. MIDAS authentication will be partially implemented. The Monarch Course Explorer Quiz and course recommendations from quiz results will be fully implemented.

4.2. Prototype Architecture (Hardware/Software)

The hardware needed is a computer with internet access. The website will be written in HTML, CSS, and JavaScript. HTML will be used for the generic website utilizations. CSS will assist in formatting and design. JavaScript will be used for user interaction. The Python portion of this prototype will use BeautifulSoup to analyze and scrape the syllabi. SpaCy will also be used to process the syllabi to contribute to the M.C.E syllabi features. The chosen Rest API will be Django since this prototype has the potential to become a complex application. For the relational database management PostgreSQL will also be used. MIDAS software will be used for the authentication process of website. Using MIDAS ensures proper security measures for only affiliated members of ODU. The development tools used to develop the prototype are VSCode and GitHub. These tools are universal and are currently taught in the curriculum at ODU.

4.2.1 Analyze and Extract Information from Syllabi

The syllabi will be uploaded and scrapped. In the prototype, there will be partial implementation of syllabi analysis of syllabi in different formats. This will enable other users including the curriculum review committee to search, access, and evaluate syllabi for all courses. Users can access original and normalized syllabi that can be filtered by section or comparison.

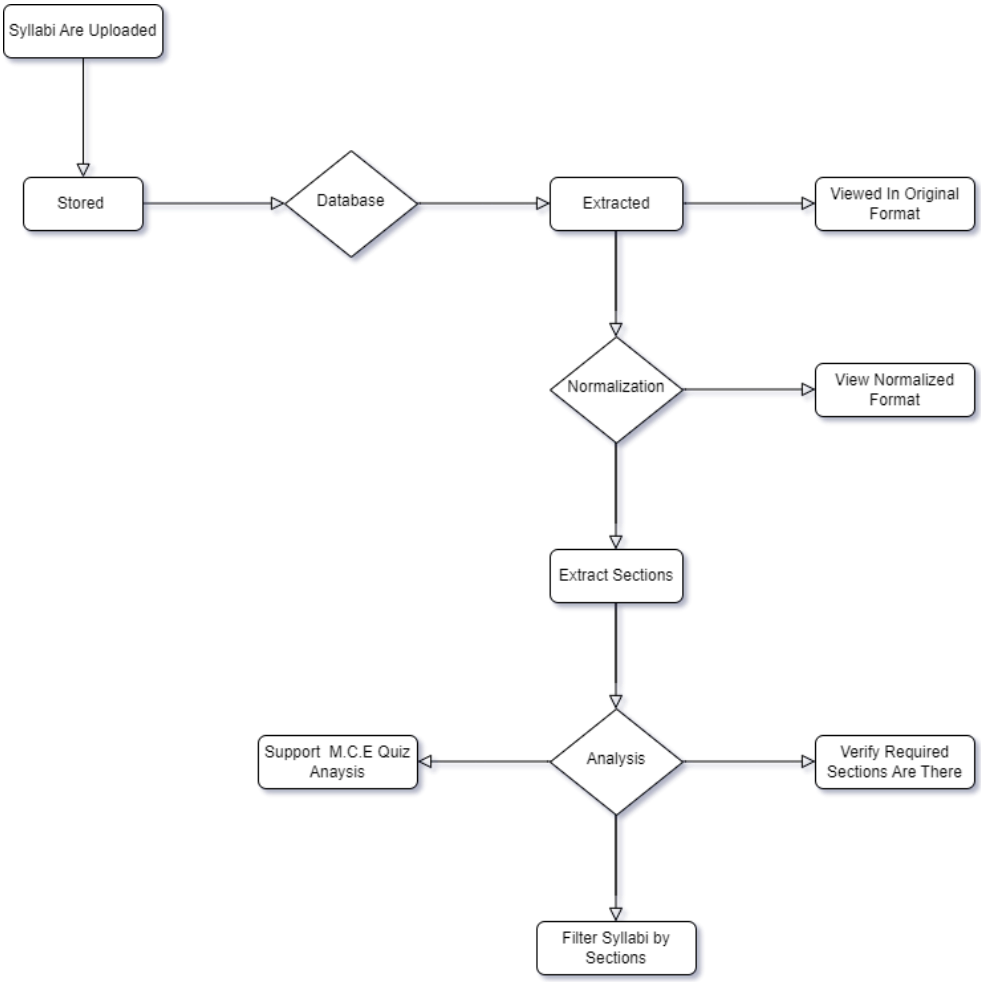

Figure 4: Syllabus Algorithm Flow Chart

Figure 4: Syllabus Algorithm Flow Chart Description
The syllabi are uploaded. Once uploaded they are stored in a database for review. Next, the syllabi will be extracted with an additional option to be viewed in original format. Once extracted the syllabi will be normalized with an additional option to be viewed in normalized format. Once the normalization is complete, the sections of the syllabi.
are extracted further for data analysis. The data obtained can be used to support the M.C.E Quiz Analysis, the filter syllabi by section, or the verify the required sections feature.

4.2.2 Feedback on courses

The feedback feature allows students provide and filter feedback on previous courses. Professors can view, rate, filter and respond to the feedback students have left about the desired course. Advisors can also view feedback and filter feedback to assist students in building a customizable course schedule.

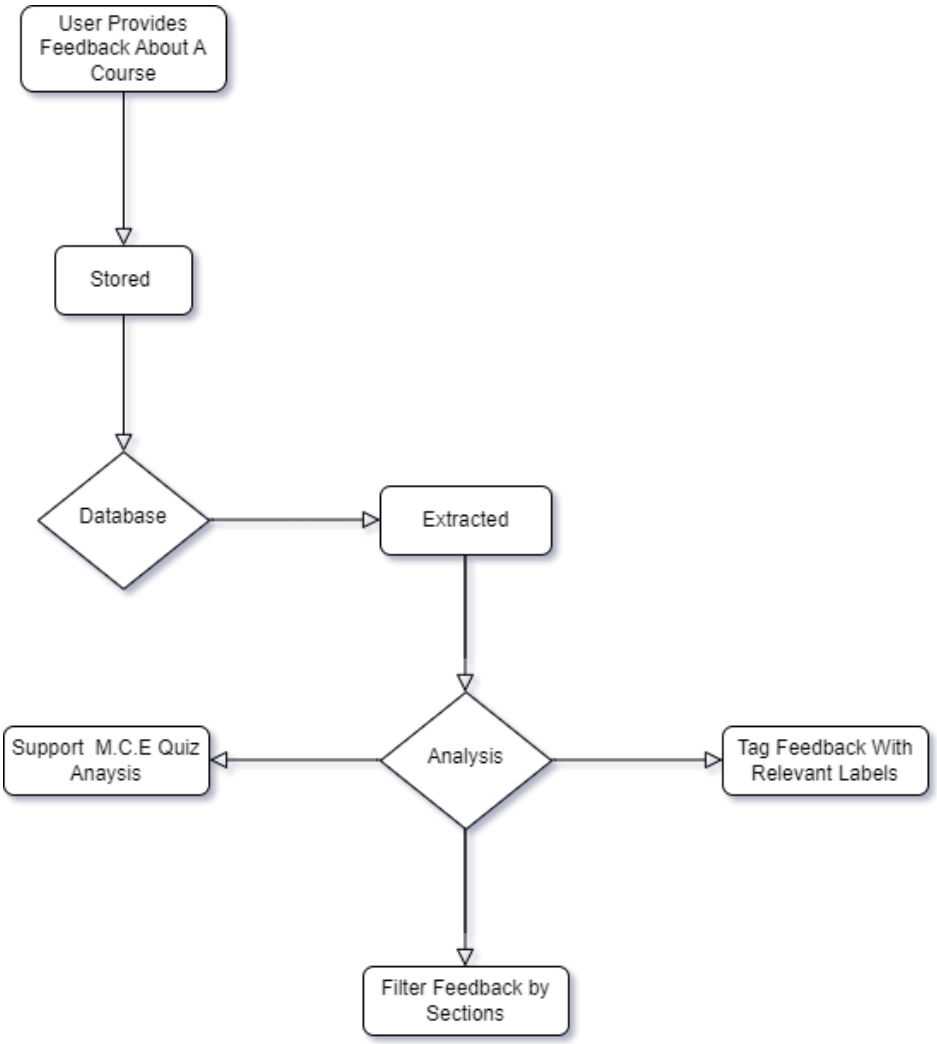

Figure 5: Feedback Algorithm Flowchart

Figure 5: Feedback Algorithm Flowchart Description
User provides feedback on the course taken. This feedback is stored in the database and then extracted for data analysis. The analysis portion can be separated into three parts. The first part assists in the M.C.E Quiz analysis results. The analysis can also be used to filter the given feedback by sections. Feedback can be tagged with relevant labels to aid in the moderation of the platform.

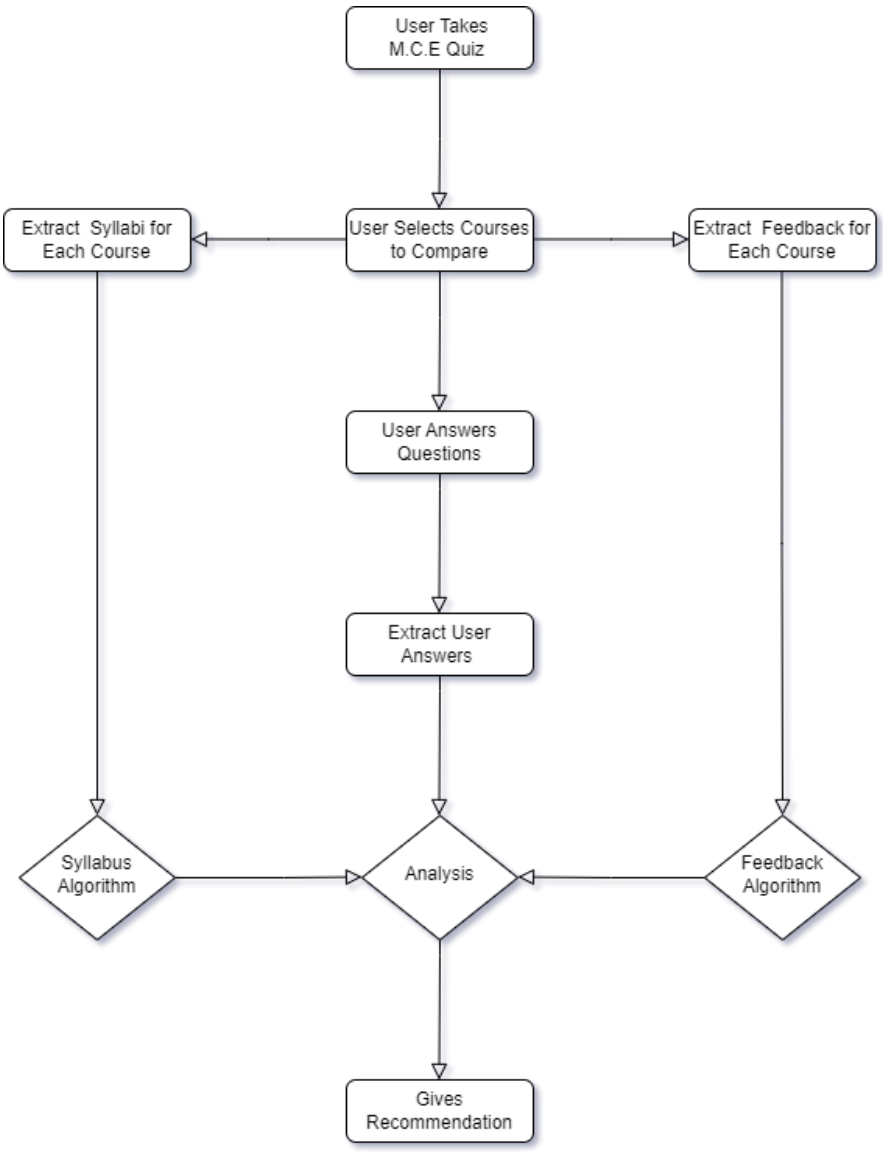

Figure 6: Recommendation Algorithm Flow Chart

Figure 6: Recommendation Algorithm Flow Chart Description

User takes the M.C.E Quiz and selects the courses to compare. After courses are selected the syllabi and feedback for the courses are extracted depending on the algorithm requested by the user. The user answers the questions designed by the quiz. M.C.E will analyze their answers corresponding to either the feedback or syllabus algorithm. After this data has been analyzed the quiz will offer recommendations for the student to make suitable choices for their upcoming semester.

4.2.4 Authentication

The protype will have MIDAS partially implemented for security and authentication for students and faculty. This will ensure the integrity of Old Dominion University is not compromised.

4.3 Prototype Development Challenges

The accuracy of Natural Language Processing can cause the syllabi analysis to be inaccurate. This can lead to major problems with the accuracy of feedback analysis. The data collection can pose another challenge in the prototype. Obtaining syllabi that are not already online can cause issues for some staff at Old Dominion University. Motivating students to continue to provide updated feedback each semester can also create a difficult challenge. Often, students only want to review a class when it goes bad. This can cause inaccurate feedback and pose a threat to the integrity of Monarch Course Explorer. The normalization of the syllabi can also cause some information to be left out. This can lead to inaccurate feedback analysis and course evaluations.

4.3 Real World Product Risks

The Customer Risks and Mitigations include:

A. Risks: Reliance on students and/or faculty to upload syllabi that are not already online.
B. Mitigations: Coordinate with ODU for release, so current syllabi can be uploaded by faculty.

The Technical Risks and Mitigations include:

A. Risks: Producing a scraper for each website requires time and effort.
B. Mitigations: Prioritize high value websites, such as the ODU website.

The Security Risks and Mitigations include:

A. Risks: Breaching our database would reveal which students offered what feedback.
B. Mitigations: Follow industry best practices (Two Factor Authentication, parameterized queries).

The Legal Risks and Mitigations include:
A. Risks: Cease and Desist from scraped websites.
B. Mitigations: Review respective terms and conditions before scraping website, and honor any requests.

5. Glossary

CSS – used to define styles for the webpage. Styles include design, layout, and variations in display.

Django – high-level Python web framework that encourages rapid development and clean, pragmatic design. Used in web development.

HTML (Hyper Text Markup Language) – Standard markup language for creating web pages.

Java – Widely used programming language for coding web applications

MIDAS (Monarch Identification and Authorization System) - a log-in ID and password management system that stores user information and communicates that information to other University networked resources.

MFCD – Major Functional Component Diagram

NLP (Natural Language Processing) - A subfield of computer science and artificial intelligence (AI) that focuses on the interaction between computers and humans in natural language.

PostgreSQL – open-source object-relational database system

RWP - Real World Product that will be developed and used.

SpaCy – a free open-source library for Natural Language Processing in Python.

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