SOEN 6841: Software Project Management

Fall 2024

PROBLEM IDENTIFICATION REPORT
FOR
AI-BASED ACADEMIC ADVISOR

Date of Submission: September 29, 2024

Team Members: (Project Group - 15)

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I. Problem Identification

AI-Based Academic Advisor for Personalized Academic Path Planning

Objective:

Traditional advising in an academic format is very much limited by time, resources and personalization. As students, we face a complex array of choices regarding our courses, majors and career paths, academic advisors often struggle to offer individualized guidance due to high workloads and limited access to data. The AI-based Academic Advisor can provide personalized guidance based on the student's preferences, performance, and future goals. It analyses a plethora of data to recommend the best course for the student, career paths, and academic strategies for students to succeed!

Content:

1. **Problem/Opportunity Statement:**

   While academic advising is an essential function in higher education, it often falls short of each student's individual needs. Conventional advising methods frequently can't take into account each student's particular learning style, interests, and professional goals. The advising process can be improved by an AI-based academic adviser who offers tailored course and career advice. This would also eliminate the decision fatigue and choice overload that's caused a great deal of stress and burden for students on top their academic deadlines. This technology would help students make wise academic decisions by responding to the growing need for customisation in education and by offering real-time, data-driven insights.

2. **Project Scope**:

   Inclusions:
   - Implementation of AI algorithms for personalized academic recommendations.
   - Real-time integration with university academic systems for tracking and advising.
   - Data-driven insights into labour market trends for career-aligned course recommendations.
   - Tools for students to plan their academic paths based on future career goals.
   - Dashboards for academic advisors to monitor student progress and intervene when necessary.

   Exclusions:
   - Marketing and promotion activities.
   - Hardware setup and infrastructure beyond what's needed for software development.
   - Manual advising services or in-person academic consulting.

Key Deliverables:
- A detailed **Software Requirements Specification (SRS)** document.
- Development of an AI recommendation engine that integrates with student information systems (SIS).
- A user-friendly interface for both students and advisors, including mobile and desktop versions.
- Training materials and tutorials for users (students and academic advisors).
- Beta testing and pilot programs in partnership with selected universities.

3. **Project Charter**:

Project Objective:

Developing an AI-driven academic advisor system that provides personalized academic and career planning recommendations to students is the goal of this project. By analyzing students' preferences, academic performance, and future goals, the system will deliver tailored advice on course selection, academic paths, and job market trends to help students succeed both academically and professionally.

Stakeholders:
- **Students**: The primary users who need personalized academic and career guidance.
- **Academic Advisors**: Will benefit from the system's ability to manage routine tasks and focus on more critical advising.
- **University Administration**: Interested in improving graduation rates and student satisfaction.
- **Employers**: Will indirectly benefit from students graduating with more relevant and aligned skills for the labor market.

Project Team:
- **Project Manager**: Oversees the project timeline, budget, and overall execution.
- **AI Specialists**: Develop the AI models for recommendations and academic path planning.
- **Software Developers**: Responsible for system development and integration.
- **UX/UI Designers**: Create user-friendly interfaces for both students and academic advisors.
- **Quality Assurance (QA) Testers**: Ensure the system works as intended through rigorous testing.
- **University Representatives**: Provide insights on the academic advising process and feedback on system functionality.

Project Milestones:
- **Phase 1**: Requirements gathering and stakeholder interviews (Week 1).
- **Phase 2**: Design and development of AI models and algorithms (Week 2-8).
- **Phase 3**: System integration with university databases and testing (Month 3).
- **Phase 4**: Pilot rollout and initial feedback collection (Month 4).
- **Phase 5**: Full implementation and training for end-users (Month 5).

Project Timeline:
- **Start Date**: November 1, 2024
- **End Date**: February 28, 2025

Risks and Mitigations:
- **Technical Challenges**: Difficulty in integrating with various university systems
  (Mitigation: Engage early with university IT departments).
- **User Adoption**: Resistance from academic staff and students to adopt the new system
  (Mitigation: Comprehensive training programs and early involvement of key stakeholders).
- **Data Privacy**: Concerns over handling sensitive student data
  (Mitigation: Strong adherence to data privacy laws like GDPR and FERPA, and transparent communication of data usage).

Budget Estimate:
- **Development Costs**: $250,000
- **AI Model Tuning and Data Integration**: $100,000
- **Maintenance and Support (Year 1)**: $50,000
- **Contingency**: $40,000 for unforeseen expenses.

4. **Stakeholder Analysis:**

- **Students**: The primary users who need timely and accurate advice tailored to their academic performance and career interests. This can build a student's confidence and put it at par with industry standards.
- **Academic Advisors**: Will have their workload reduced, with AI supporting mundane tasks and allowing them to focus on more complex student concerns.
- **Universities**: Benefit from higher student satisfaction and retention rates, while maintaining academic standards.
- **Employers**: Can access graduates who are better prepared and aligned with industry needs, reducing training costs and improving workforce readiness.

5. **Relevance to Software Solution:**
   AI-based solutions can overcome the drawbacks of conventional academic advice by analysing past student data, course completion rates, and employment patterns using machine learning models. This enables more precise, tailored recommendations that beyond general guidance, assisting students in maintaining academic progress and coordinating their education with professional aspirations. Furthermore, the system may incorporate up-to-date labour market data to modify academic courses in response to employment patterns.

6. **Initial Thoughts on Scope of the Software Solution:**

   o **Feature Set:**
      - Personalized course recommendations based on academic performance, preferences, and career goals.
      - Real-time alerts for academic deadlines, graduation requirements, and relevant career opportunities.
      - Integration with existing academic systems like student management systems (SMS) and learning management systems (LMS).
      - Insights into labour market trends, suggesting courses aligned with in-demand skills. (Latest and updated)
      - Gamification elements to keep students engaged with their academic planning. (Points for progression)

   o **Technological Considerations:**
      - Use of Natural Language Processing (NLP) for interactive academic advising.
      - Machine learning algorithms for personalized recommendations and future academic trajectory predictions.
      - Integration with existing university systems for real-time academic data collection with appropriate use for it.
      - Cloud-based infrastructure for scalability and data storage.

   o **Training and Support:**
      - Training programs for students and advisors to effectively use the platform.
      - Ongoing support and updates to ensure optimal system performance and relevance.

   o **Pilot Implementation:**
      - Initial rollout with a selected group of students and advisors to gather feedback and improve system functionality before full implementation. Also, a few guidance courses to let students get some tangible advice and data for the LLM's.

II. Market Analysis

Market Analysis Report for AI-Based Academic Advisor

Objective:
Conduct an in-depth market analysis to understand the demand for AI-driven academic advising systems, assess potential competitors, and identify the unique value proposition for our AI-based advisor solution.

Content:

1. **Target Audience Identification:**

   - **Primary Target Audience**: University students aged 18-25 who are looking for personalized academic and career guidance while trying to find one or many ways to succeed at University.
   - **Demographic Characteristics**: Students in higher education institutions (universities and colleges), while this is best for students of all ages, we chose higher education institutions as it helps narrow the market and also gives them an opportunity to follow the career soon after they graduate.
   - **Psychographic Characteristics**: Students seeking guidance on balancing academic responsibilities with career planning, particularly those in competitive and technical fields like engineering, IT, and business. But also, students who are creatively focussed but lacking in the skills needed and can be helped with a focus in pathways.

2. **Competitor Analysis:**

   - **Competitors**:
     - **Traditional Academic Advising Platforms**: Many universities use software for scheduling advising appointments and managing academic records, but these tools lack personalized, real-time feedback. They usually have all the right information just not delivered to the right person at the right time.
     - **EdTech Platforms (e.g., Coursera, LinkedIn Learning)**: Platforms offer career advice and upskilling but do not integrate academic planning with university systems.
     - **AI-Powered Tools**: Emerging platforms like DegreeWorks and Stellic offer some personalized advising tools but lack real-time career trend analysis. And they lack the information on specifics from the student's university.

- **SWOT Analysis**:
  - **Strengths**: Personalized/Customized, real-time academic advising; integration of labour market data and career trajectory data graphs.
  - **Weaknesses**: High upfront development costs, potential resistance to AI-driven advice from academic staff.
  - **Opportunities**: Growing demand for EdTech solutions that offer personalized experiences which are necessary for the students.
  - **Threats**: Competition from larger EdTech platforms and potential data privacy concerns which could pose risks.

3. **Business Values:**

Unique Selling Points (USPs):
- Customized academic paths.
- Integration of academic and career advising into one platform.
- Real-time market insights for academic decisions.
- 24/7 access to advice and planning tools, reducing dependency on in-person advisors as a chat model.
- Ethical use of AI with a focus on data privacy and transparency.