

Academic Advisor System

1. Introduction

This report outlines a system for personalized course recommendations in universities. It models academic curricula and student profiles to suggest optimal course paths, aiming to improve student success by aligning course selections with individual academic history, interests, and program requirements.

2. Curriculum Graph and Student Data

The academic curriculum is represented as a directed graph, where courses are nodes and prerequisites are directed edges. Each course node includes attributes like credit hours. This structure ensures recommendations respect course dependencies. Each profile includes a unique ID, completed courses with grades, current GPA, declared academic interests and current term.

3. Personalized Recommendation Strategy

Student State: A student's current academic situation is defined by their completed courses, GPA, term number and interests.

Course Selection (Action): The system recommends a set of eligible courses for the next term, considering prerequisites and student interests.

Outcome Evaluation (Reward): The effectiveness of course selections is quantified by a reward mechanism that includes:

GPA Improvement: Positive reward for GPA increase.

Interest Alignment: Positive reward for courses matching student interests.

Progress Towards Graduation: Positive reward for completing new courses.

4. Example Course Recommendation Results:

Sample Student 1: S001

Interests: [AI, Security]

Initial State: No completed courses, GPA 2.94, Term 1.

Recommended Courses: [CS101, MA101]

Calculated Reward: 7.99

New State: Completed 2 courses, GPA 3.34, Term 2.

Sample Student 2: S002

Interests: [Security]

Initial State: Completed CS101, DS401; GPA 3.72, Term 1.

Recommended Courses: [CS201, MA101]

Calculated Reward: 1.99

New State: Completed 4 courses, GPA 3.52, Term 2.

Sample Student 3: S003

Interests: [AI, Security]

Initial State: Completed CS301; GPA 2.68, Term 1.

Recommended Courses: [CS101, MA101, SE501]

Calculated Reward: 12.59

New State: Completed 4 courses, GPA 3.34, Term 2.

5. Curriculum Graph Visualization:

