



Design and Implementation of Career Planning Course Assistant System Based on Agent in Higher Education

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Abstract. In response to the pain points of lack of personalized guidance, low resource matching efficiency, and insufficient scientificity of planning schemes in higher education career planning courses, this article designs and implements a career planning course auxiliary web system that integrates intelligent agents. The system uses Python as the backend development language, builds a service architecture based on the Flask framework, uses PostgreSQL database for data storage and management, and integrates intelligent agent modules based on big language models to achieve core functions such as career assessment analysis, real-time career counseling, and intelligent recommendation of course resources. The test results show that the system can provide students with precise and intelligent career planning guidance, while assisting teachers in efficiently conducting learning situation analysis and teaching optimization, significantly improving the teaching quality and practical value of higher education career planning courses.

Keywords: Educational intelligent agent, Higher education, Career Planning Course, Database.

1 Introduction

In the context of high-quality development of higher education in China [1], career planning courses, as the core courses connecting campus and workplace, need to transform their teaching mode from standardization to personalization [2]. There are still many problems with the current career planning courses in universities. Firstly, teachers find it difficult to develop differentiated planning plans for each student. Secondly, the matching of course resources with students' career needs is low. Lastly, the career counseling process is limited by teachers' time and professional abilities, making it difficult to provide students with real-time and accurate guidance. Agents, with their characteristics of autonomous decision-making, intelligent interaction, and personalized services, provide a new path to solve the above problems [3]. Ladkat et al. [4] constructed a personalized career planning service using local large language models (LLMs) and multi-agent systems, but the local LLMs cannot dynamically obtain data, which can lead to information lag. Sham et al. [5] analyzed suitable career paths for students by integrating information from college students and using AI driven recommendation modules. However, there may be biases in the training data of AI that could lead to

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inaccurate recommendations for students. Zhang et al. [6] used DeepSeek to construct intelligent agents and applied them in medical courses, but the accuracy of the data obtained by AI models through networking cannot be guaranteed. Wang [7] designed a layered architecture intelligent learning assistant based on intelligent agents, but the agents may have limitations in knowledge coverage.

This paper proposes a career planning course assistance system based on Flask, a lightweight web framework, and an intelligent agent with tool calling capabilities to address the issues of inability to customize customized plans for students and insufficient coverage of general large model knowledge in the aforementioned career planning courses.

2 System Requirement Analysis and Basic Components

2.1 System Functional Requirement Analysis

The student assessment module should support mainstream assessment tools such as MBTI and provide a simple and easy-to-use visual answer interface. After the assessment is completed, a result report should be automatically generated and saved to the database as one of the corpus fed to the intelligent agent.

The intelligent agent Q&A module should support text input for questioning and be able to view historical conversation records. The consultation content should be associated with personal data.

The resource acquisition module should recommend course resources and job information based on personal characteristics, and support resource collection and download.

As one of the important components of the system, intelligent agents should meet the following four functions:

1. Ability to read students' assessment data and personal information from PostgreSQL database.
2. Strong natural language processing ability, able to accurately understand students' semantics.
3. Differentiated assessment reports and planning schemes can be generated based on student characteristics.
4. Fast and real-time response capability.

2.2 Fast and Real-Time Response Capability

The course assistance system proposed in this article adopts a layered architecture and adds an external service layer on top of the basic front-end and back-end to integrate the intelligent agents of the Coze platform.

3 System Architecture and Database Design

3.1 System Architecture and Database Design

The overall architecture of the system is shown in Fig.1, which clearly illustrates the functions and interrelationships of different core layers.

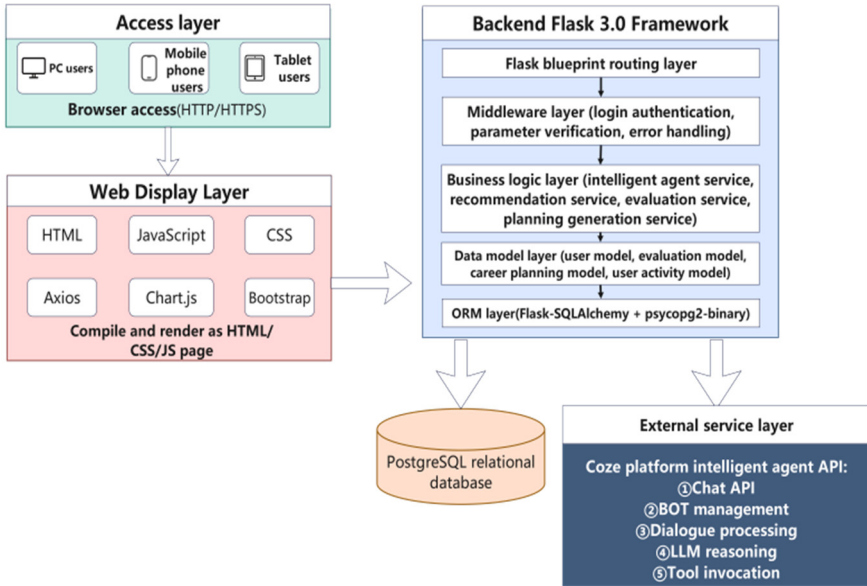


Fig. 1. The overall architecture of the system

Users access the frontend through a multi terminal browser, and the frontend requests are processed through layers such as routing, middleware, and business logic in Flask backend. They then connect to the PostgreSQL database to store data and call the intelligent agent API to achieve intelligent interaction and analysis, providing auxiliary functions for a complete course.

3.2 Database Design

PostgreSQL 18.1 relational database is compatible with the Flask framework and has good concurrency performance and scalability. And it supports complex queries and transactions, as well as JSON fields for storing structured data such as student assessment data and planning goals [8].

The career_planning database contains six data tables, among which Table 1 is the career assessment table, used to store students' assessment data for intelligent agents to conduct differentiated analysis on individual students.

Table 1. Career Assessment Form

Attribute meaning	Property name	Data type	Primary/Foreign Key	Remark
Evaluation ID	id	INTEGER	Primary key	Increment
User ID	user_id	INTEGER	Foreign key (associated with users)	Cannot be empty
Evaluation Type	assessment_type	VARCHAR		Cannot be empty
Question List	questions	JSON		Evaluation issues
Answer List	answers	JSON		User answers
Evaluation results	result	JSON		Calculation results
Overall Score	score	FLOAT		Total score of evaluation
AI analysis results	analysis	TEXT		Nullable
Creation Time	created_at	TIMESTAMP		Auto Setup

4 Construction and Call of Career Planning Intelligent Agent

4.1 Selection of Large Language Models

Doubao 1.5 pro is a new generation of big model launched by ByteDance on January 22, 2025. It has significant advantages in performance, efficiency, multimodal capability and long text processing. Its comprehensive strength can enter the world's first-class echelon [9].

4.2 Intelligent Agent Skill Expansion

The large language model of pure natural language dialogue cannot meet the complex needs of students. In order to better match the actual needs of students with the application scenarios of intelligent agents, it is necessary to expand the skills of the model. The skills added to the career planning agent are shown in Fig. 2. The process of using these skills is called function call, which is one of the core abilities for large models to interact with external tools.

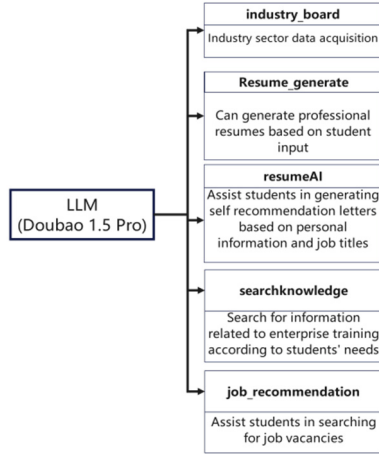


Fig. 2. Skill Expansion of Large Models

4.3 Intelligent Agent Calling Process

The call of the intelligent agent adopts an asynchronous polling mechanism, and the button platform API is called through the Coze SDK to achieve AI dialogue function. The entire process includes steps such as user input, backend processing, API calls, status polling, message parsing, and result return, ensuring that users can receive complete AI responses. The overall call process diagram is shown in Fig. 3.

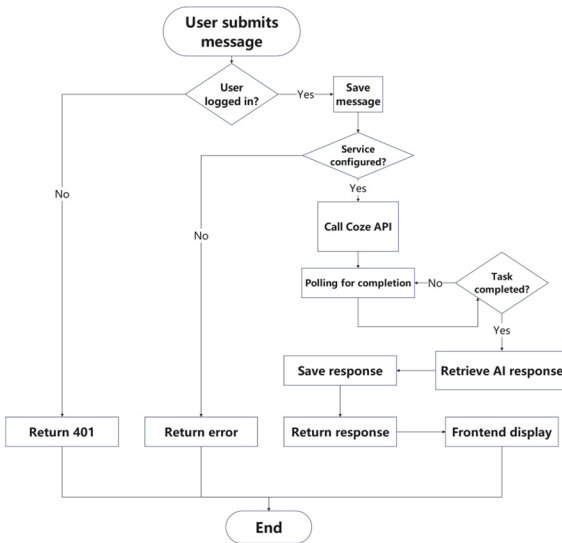


Fig. 3. Agent call process diagram

5 System Implementation

The front-end of the system is based on Bootstrap 5 to build a responsive interface, and uses the Jinja2 template engine to implement page inheritance and dynamic rendering. The backend is built using the Flask framework, with modular design achieved through Blueprint blueprints. Flask QAlchemy is used to manage six core data tables in the PostgreSQL database, enabling vocational assessment calculations, planning scheme management, course recommendation algorithms, and intelligent interaction functions through the integration of AI agent services using the Python SDK (cozepy) on the Button Platform. At the same time, in order to adapt to users in different regions, the system supports switching between Chinese and English.

5.1 MBTI Personality Assessment Module

MBTI (Myers Briggs Type Indicator) is one of the most widely used personality assessment tools in the world today. Describing a person's personality type through 4 dimensions and 2 tendencies, there are a total of 16 combinations of personality types. The MBTI personality test module is shown in Fig. 4.

Career Planning System Home Dashboard Assessment Career Planning Resources AI Chat About Language admin

MBTI Personality Assessment

0 / 16

Total 16 Questions | Please answer honestly

Please select the option that best matches your actual situation. There are no right or wrong answers. The assessment results will help you better understand your personality traits and career tendencies.

1 In social situations, you usually:

A. Actively communicate with others and enjoy interaction

B. Prefer to listen and observe, communicate deeply with a few people

2 On weekends, you prefer to:

A. Attend parties or outdoor activities with friends

B. Stay home alone reading, watching movies or doing your own things

3 When encountering problems, you tend to:

A. Immediately discuss with others to clarify your thoughts

B. Think independently first, then communicate with others

Fig. 4. Example of MBTI Personality Assessment Answering Module

After completing the evaluation, the system will conduct an MBTI personality assessment based on the user's answer situation, and provide analysis results and future recommendations. At the same time, the evaluation data will be stored in the database for preservation. The evaluation results are shown in Fig. 5.

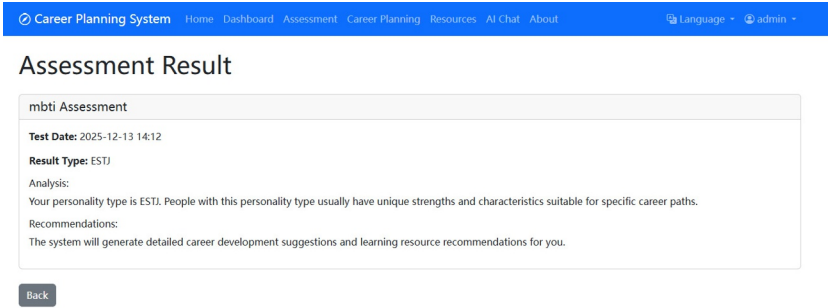


Fig. 5. MBTI evaluation results

Through MBTI testing, students can understand their personality strengths and limitations, choose suitable work environments, and develop their personal strengths.

5.2 Intelligent Agent Q&A Module

As shown in Fig. 6, the intelligent question answering module implements intelligent dialogue consultation services through the integration of the button platform (Coze)'s large language model API.

After the user inputs career planning related questions in the front-end, the system will automatically integrate the user's registered personal information as context, create a conversation through the backend agent_service.py service calling the Coze API, use asynchronous polling mechanism to obtain AI replies, and save the complete conversation history to the database for subsequent query and analysis.

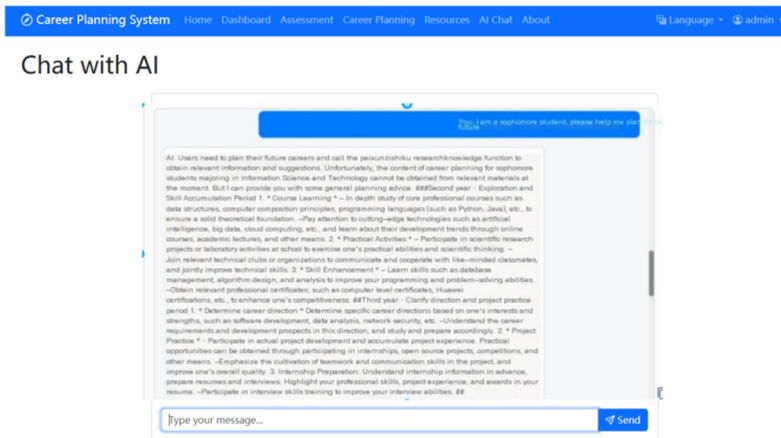


Fig. 6. Agent Q&A module

This module not only provides real-time career advice, but also provides personalized development suggestions based on user evaluation results, planning plans, and

other data, achieving progress from traditional static planning to dynamic intelligent coaching, greatly improving the scientificity and pertinence of career planning.

6 System Testing

6.1 Page loading time test

Perform performance testing using Apache JMeter to simulate system response time under different concurrent user numbers.

Table 2. Page response time test results

Page	Number of concurrent users	Average response time	Status
Home page	1200	245ms	excellent
Dashboard	1200	428ms	qualified
Evaluation page	1200	289ms	excellent

As shown in Table 2, the response speed of the system core page can still meet the needs of most users under simulated high concurrency conditions.

6.2 API Interface Response Time Test

The API interface response time test results are shown in Table 3, with static page and query response times both within 1 second, providing a good user experience.

Table 3. API interface response time test results

Interface	Number of concurrent requests	Average response time	Status
User login	100	156ms	excellent
Submit Review	20	264ms	qualified
Agent Q&A	10	2.3s	qualified
Course List	50	178ms	excellent

After testing, the system has achieved the expected design goals and achieved a good level of response time and concurrency capability.

7 Conclusion

This article designs and implements a career planning course auxiliary web system to address the problems of lack of personalized guidance, low resource matching efficiency, and insufficient scientific planning schemes in vocational planning course teaching in higher education. Through system testing and verification, each functional

module runs stably with good performance indicators, successfully achieving the transformation from traditional static career planning to intelligent, personalized, and dynamic coaching, providing effective technical support and innovative solutions for higher education career planning courses.

Although this system has achieved the expected functional goals and passed system testing, there are still some directions that can be further optimized and improved. Firstly, the current system relies on external API calls, and response time is greatly affected by network conditions. In the future, it is possible to consider deploying localized large language models to improve response speed and personalization. Finally, the data analysis function of the system still needs to be strengthened, and big data technology can be used for mining and analysis to provide employment guidance and decision support for schools.

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