AI Virtual Career Counsellor –

Project Report

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1. Introduction

The **AI Virtual Career Counsellor** is an intelligent platform designed to guide students in exploring career opportunities and making informed decisions. The system leverages **Artificial Intelligence (AI)** and **Natural Language Processing (NLP)** techniques to interact naturally with users, understand their interests, and provide personalized career recommendations.

The need for career guidance among students has grown due to the increasing variety of career options and evolving job market trends. Traditional counselling methods are often limited in reach and scalability, whereas an AI-based solution can provide **24/7 support, instant feedback, and personalized recommendations**.

The platform integrates a **Rasa-based chatbot** for conversational interaction and a **Streamlit frontend** for an accessible, interactive user interface. The design emphasizes ease of use, reliability, and accessibility for students with varying technical skills.

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2. Objective

The main objectives of the AI Virtual Career Counsellor are:

- To **provide personalized career recommendations** based on the user's interests in Tech, Arts, or Commerce.
- To **assist students in understanding career paths**, required skills, and future prospects for each domain.
- To **offer an interactive, engaging experience** through a conversational interface, simulating real-life career guidance sessions.
- To **support accessibility**, ensuring that visually impaired students or users with limited technical knowledge can easily navigate the platform.
- To **act as a learning companion**, providing references to external resources that help students explore career-related knowledge and skill development.

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3. Features

The platform incorporates the following key features:

1. **AI Chatbot for Career Recommendations:**
    - Uses Rasa's NLP pipeline to analyze user input, detect intent, and classify interests.
    - Provides a curated list of potential career options for each user query.
2. **Interactive Streamlit Frontend:**
    - User-friendly interface for submitting inputs and receiving recommendations.
    - Supports real-time interaction with the AI chatbot.
3. **Input Preprocessing:**
    - Employs **NLTK** for cleaning, tokenizing, and normalizing user input to improve model accuracy.
    - Handles variations in user queries, including synonyms and common typos.
4. **Accessibility Features:**
    - Interface designed for simplicity.
    - Compatible with screen readers and keyboard navigation.
5. **Resource Integration:**
    - Suggests relevant learning materials such as articles, online courses, or tutorials based on the recommended career paths.
6. **Extensibility:**
    - Easily adaptable to include more domains, languages, or enhanced features such as personality-based recommendations.

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4. System Architecture

The system is composed of three primary components:

1. **Rasa Chatbot**
    - Handles all conversational logic and natural language understanding.
    - Custom actions in `actions.py` determine the career recommendation logic.
    - Designed to respond contextually based on the user's previous inputs.
2. **Streamlit Frontend**
    - Acts as the interactive layer where users input their interests.
    - Displays chatbot responses and recommended career paths dynamically.
    - Provides a visually appealing and intuitive user experience.
3. **Preprocessing Module**
    - The `preprocess_nltk.py` module cleans user input by removing stopwords, punctuation, and normalizing text.
    - Preprocessing ensures that the NLP model can interpret queries accurately and efficiently.

Workflow:

```
User Input → Preprocessing → Rasa Chatbot → Career Recommendation → Streamlit Display
```

This modular architecture allows **easy maintenance, scalability, and integration** with additional AI components in the future.

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5. User Classes and Characteristics

1. **Primary Users:**
    - Students across high school and college seeking guidance on career options.
    - Users who are exploring Tech, Arts, or Commerce domains.
    - Individuals motivated to plan their education and skill development.
2. **Secondary Users:**
    - Educators or mentors guiding students in career planning.
    - Can monitor the types of questions asked and refine suggestions for students.

User Characteristics:

- Basic familiarity with web interfaces.
- Interest in career exploration and educational advancement.
- Need for quick, reliable, and personalized recommendations.

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6. Operating Environment

- **Frontend:** Accessible via any modern web browser (Chrome, Edge, Firefox).
- **Backend:** Python-based Rasa server for handling NLP and chatbot interactions.
- **Dependencies:**
    - Python 3.9 or higher
    - Rasa for conversational AI
    - Streamlit for frontend interface
    - NLTK for text preprocessing
- **Hardware Requirements:**
    - Standard laptop or desktop
    - Internet connection for downloading resources or API-based responses

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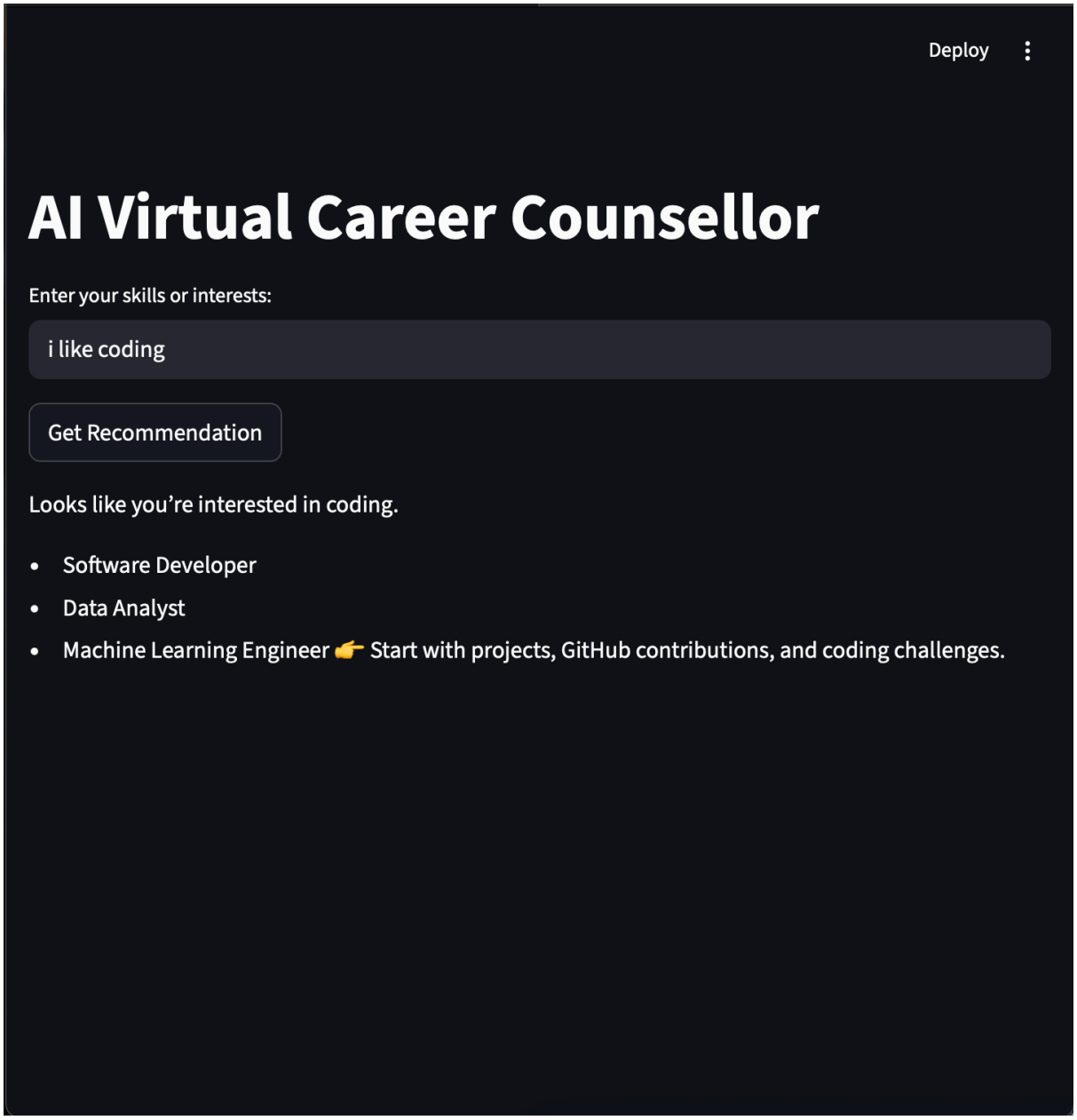
7. Design and Implementation Constraints

- The system depends on accurate user input; ambiguous or incomplete queries may reduce the quality of recommendations.
- Requires Python environment with all dependencies installed.
- Performance depends on server resources for Rasa processing.
- Accessibility is limited to web-based support; additional features like mobile optimization can be added in future versions.
- Recommendations are based on predefined logic and curated knowledge; it does not replace professional career counselling.

8. Screenshots

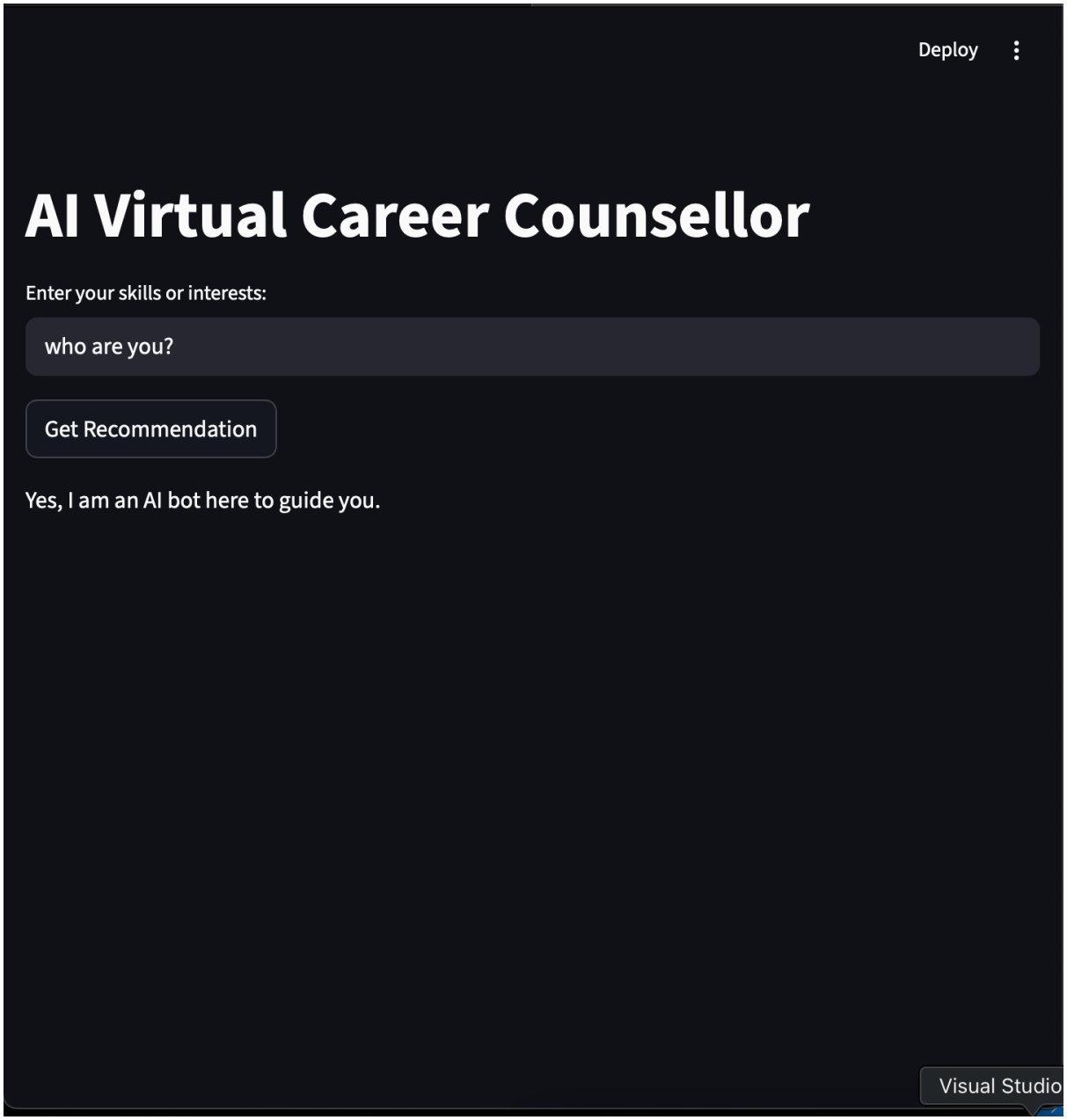
Streamlit App – Input 1

User enters “I like coding” as interest and then career recommendation from chatbot:



Streamlit App – Input 2

User enters **“who are you?”** as interest:



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9. User Documentation

- Open the Streamlit frontend using:

```
streamlit run streamlit_app/app.py
```

- Enter your interests in Tech, Arts, or Commerce.
- The chatbot will process the input and provide career recommendations.
- Click on suggested resources for further learning.
- Regular use allows students to explore multiple domains and compare career paths.

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10. References

1. Rasa Documentation – https://rasa.com/docs
2. Streamlit Documentation – https://docs.streamlit.io/
3. NLTK Documentation – https://www.nltk.org/

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11. Conclusion

The **AI Virtual Career Counsellor** successfully demonstrates how Artificial Intelligence and Natural Language Processing can be applied to provide practical career guidance to students. The platform offers a **scalable, accessible, and interactive environment** where students can explore potential career paths tailored to their interests in Tech, Arts, or Commerce. By simulating the experience of a personalized career counsellor, it reduces the dependency on human resources while still delivering reliable guidance.

Through the integration of **Rasa-based chatbot technology**, the system can understand user inputs, identify their intent, and generate meaningful recommendations in real-time.
The **Streamlit frontend** enhances the user experience by providing a visually intuitive interface that is easy to navigate, ensuring that even users with minimal technical skills can interact comfortably with the system.

The **modular architecture** of the system allows for future expansion, including the addition of more career domains, support for multiple languages, and the incorporation of advanced AI-driven features such as skill gap analysis or personality-based career suggestions. Additionally, the platform is designed to be **accessible**, accommodating students with visual impairments and offering a clean, simple interface that supports screen readers and keyboard navigation.

Beyond career recommendations, the system serves as a **learning companion**, encouraging students to explore relevant resources and improve their knowledge about different professions. By providing consistent, personalized guidance, the AI Virtual Career Counsellor can help students make **informed decisions** about their educational paths, skill development, and career trajectories, ultimately empowering them to achieve their long-term goals.

In summary, the project not only highlights the practical applications of AI in the education sector but also lays the groundwork for a **flexible, expandable, and intelligent career counselling solution** that can adapt to future student needs, technological advancements, and evolving career landscapes.