

# EDU Tour – Career Recommendation System

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*Abstract—Today, students have limitless choices when it comes to academic and career options. Given the lack of automated, tailored support, many students are left to navigate the complex world of career decisions on their own, leading to undesirable outcomes. In this project, we develop an AI-based web application that forecasts individualized career paths using a Long Short-Term Memory (LSTM) neural network through a Flask application. The system is built to provide instant, scalable, and backed by data career suggestions in a sleek and intuitive platform.*

*Keywords—education technology, student interests, Flask, LSTM, deep learning, career prediction.*

## I. INTRODUCTION

Today's educational systems are highly competitive. At this point, numerous students are impacted by external factors such as societal pressure, peer groups, or popular careers when choosing academic and professional pathways. Unfortunately, that tends to diverge from the focus of students' real interests and the greatly desired career paths. Though helpful, traditional methods of career counselling are fundamentally focused on some form of hand work. These methods can prove tedious, regionally restrictive, and impossible to scale to large populations.

Recent advancements in AI, and especially Deep Learning, have enabled the creation of more sophisticated and scalable systems that can be tailored to individual needs. These technologies may help transform career guidance delivery.

To address this gap, the proposed system refers to "Student Career Path Prediction System." This system aims at a more accurate, efficient, and captivating approach to career guidance using the components enlisted below:

- Interest Exploration: Enabling users to pinpoint their primary and secondary interests which will be used as a basis for predictions.

- LSTM Deep Learning Functionality: Applying Long Short Term Memory networks for Interest data pattern recognition.
- A Real Time Web Interface: Permitting user interactivity with modern web technologies and real-time feedback.

Students are steered towards selecting from a refined list of academic interests through this method. With the AI model running in the backend, it predicts an ideal field of study alongside an academic degree and probable career to persuade the student. The result is an enhanced data-informed, student-focused decision-making process educationally.

## II. LITERATURE SURVEY OVERVIEW

### A. Existing Systems

As of now, there are various tools available on the internet which offer career guidance like CareerFitter and MAPP (Motivational Appraisal of Personal Potential). With the provided services, their offered assistance is limited to basic aptitude or personality tests. It is clear that services do not extend far enough to relate level of interest in a subjects to a much broader scope of career or academic pathways. Furthermore, these systems do not change in response to user feedback or progress (career progression user trends) and wider employment market shifts, making them quite inflexible.

### B. Related Works

Some educational platforms, including Coursera, LinkedIn Learning, and EdX, provide skill-based learning and automatically suggest relevant courses to the users based on their prior activities. Although these systems assist with skill development by providing upskilling services and certificates, they do not purport to create a reliable overview to interests and predictive academic and career pathways. Such tools aren't intended to serve as or even augment dedicated career counselling instruments.

### C. Gaps Identified

While there are solutions currently available, the following problems continue to critically persist:

- Throughout: These platforms are overly simplistic and do not take into account interactivity or instantaneous feedback/narrative features that may enhance user engagement.
- Lack of Multi-Interest Structured Mapping: These systems ignore combinations of interests which may represent multi-disciplinary careers.
- Recommendation of Undeniable Degrees: There is no

#### D. Significance of Current Work

The suggested system overcomes these drawbacks by utilizing a creative strategy that integrates interactive design with AI-powered intelligence. It presents:

- An interactive, visually appealing interface that promotes discovery and enhances the enjoyment of the experience.
- An advanced logic system driven by sequential AI models to comprehend intricate interest trends.
- Impactful and expandable counselling services that cater to individual users while addressing a wide range of people.

### III. METHODOLOGY

#### A. Proposed System Overview

The suggested solution focuses on a smart AI system integrated into a dynamic web application. At its foundation, the system employs a Long Short-Term Memory (LSTM) driven deep learning model for sequential forecasting, allowing it to manage the intricate connections among various interest inputs. The complete system is implemented using the Flask web framework, which makes it lightweight and reachable through common web browsers.

The forecasting system is intended to:

- Receive inputs based on subjects of interest chosen by the user.
- Convert and prepare these inputs to ensure they work with the trained deep learning model.
- Create three individualized forecasts: Area of Study, Educational Qualification, and Professional Journey.

Key features include:

- Instantaneous Interest Pair Verification: Utilizing AJAX integration, the system confirms that interest combinations are contextually appropriate and significant prior to model processing.

- Interactive and Easy-to-Use Interface: A versatile user interface enables users to drag, drop, or look for interests, ensuring the experience is straightforward and user-friendly.

- Model Comprehensibility: The outcomes of the model are translated and displayed in an understandable manner, aiding users in grasping the reasons behind specific predictions.

#### B. System Architecture

The framework of the Student Career Path Prediction System is crafted to be modular, scalable, and understandable. It consists of the subsequent essential elements:

- Data Gathering Layer: Tasked with collecting information from various sources, such as user-provided profiles, educational history, and outside job market trends.

- Pre-processing Layer: Guarantees that the data is cleansed, standardized, and converted into formats appropriate for AI training. It additionally identifies important characteristics, including patterns of subject co-preference and user demographics.

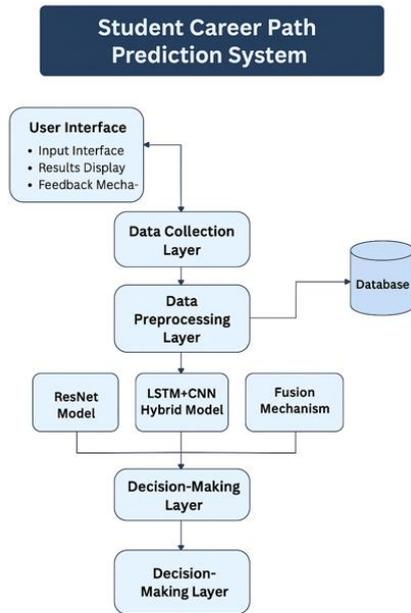
- Model Layer: Utilizes a hybrid structure that merges LSTM with CNN (Convolutional Neural Networks). Although LSTM identifies sequential trends in user preferences, CNN improves spatial comprehension and feature extraction, resulting in stronger predictions.

- Fusion Mechanism: Functions as a cohesive layer that merges the results from various model elements to generate a conclusive, unified prediction assortment. It guarantees that outputs are logically coherent and customized to user profiles.

- User Interface: Offers a user-friendly and organized front-end where individuals enter their choices and receive recommendations. It's designed for responsiveness and is compatible with both desktop and mobile browsers.

- Database Layer: Safely holds user inputs, session histories, and produced recommendations. This layer facilitates ongoing monitoring and empowers the system to enhance itself over time through additional user data.

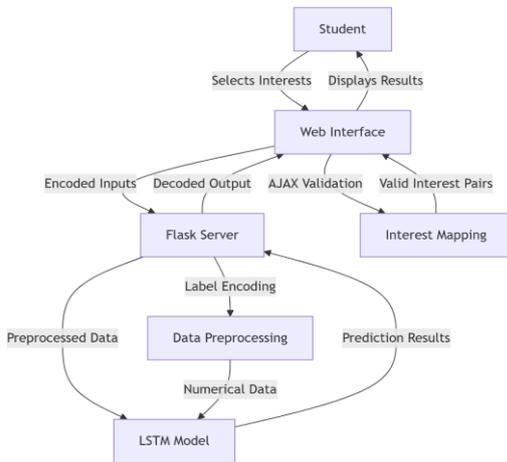
#### System Architecture



C. System Flow

1. Student chooses main interest
2. AJAX retrieves valid alternative interest choices.
3. Choices encoded with LabelEncoder
4. The model forecasts three outcomes.
5. Outputs translated into a human-understandable format.
6. Outcomes presented in a tidy Bootstrap user interface.

Data Flow Diagram



IV. TOOLS AND TECHNOLOGIES USED

A well-organized amalgamation of programming languages, frameworks, libraries, and databases has been utilized to create the Student Career Path Prediction System. These technologies together facilitate the backend processes, machine learning algorithms, real-time engagement, and user interface.

A. Programming Languages & Frameworks

- Python: Functions as the main backend language for managing data processing, model integration, and server-side operations. Its straightforwardness and extensive library ecosystem render it an excellent option for machine learning applications.
- Flask: A minimalistic and versatile web development framework in Python. Flask enables quick development of backend logic and API endpoints. It allows for smooth integration between the model and the user interface while preserving a small footprint.
- HTML, CSS, and JavaScript: These elements collectively establish the basis of the front-end interface. HTML organizes the content, CSS enhances the elements for a visually appealing design, and JavaScript incorporates interactivity to elevate user experience
- AJAX (Asynchronous JavaScript and XML): Allows live interaction between the client and server without needing to reload the entire page. It is utilized specifically for validating the combinations of chosen interests in real-time, improving the system's responsiveness.

B. Machine Learning Libraries

- Keras & TensorFlow: These deep learning frameworks are used to build, train, and deploy the LSTM-based neural network model. TensorFlow serves as the backend engine, while Keras provides a high-level API to simplify the model construction and experimentation process.
- LabelEncoder (from scikit-learn): Used to convert categorical input features (such as interest names) and model predictions (e.g., careers, degrees) into numerical representations for processing, and then decode them back to human-readable labels after prediction.

C. Database

- SQLite: A server less, self-contained relational database management system that is lightweight and easy to integrate into Flask applications. It stores user data such as login credentials, selected interests, and generated career predictions efficiently and securely, making it suitable for local or small-scale deployment environments.

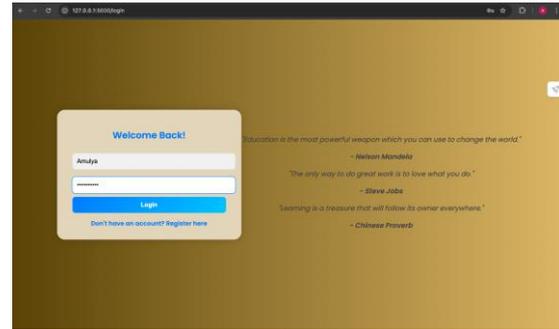
V. MODULES DESCRIPTION

The suggested system is modular in nature, encouraging separation of concerns and facilitating scalability. Every module manages a particular task in the user experience—from logging in to choosing interests, and ultimately obtaining career advice.

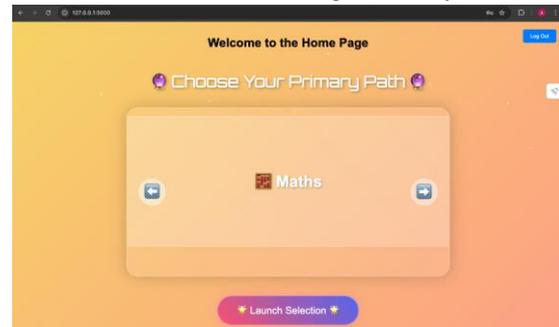
1. **User Authentication Component** This component handles the registration and login features. It employs SQL-based verification to confirm the legitimacy of users. It guarantees data confidentiality and offers access management for customized suggestions.
2. **Interest Selection Module** After authentication, users are taken to a selection interface where they can select their main and secondary interests. The dropdowns utilize a mapping mechanism that guarantees only logically compatible combinations are permitted, reducing confusion and enhancing data consistency for model input.
3. **Validation Module** This component is tasked with real-time validation of user-chosen interest pairs. Implemented with AJAX, it dispatches asynchronous requests to the server to verify if the selected combination of primary and secondary interests is acceptable.
4. **Forecasting Module** This serves as the primary intelligence component of the system. After valid interests are chosen, the module executes these steps:
  - o **Encoding:** The chosen interests are represented numerically with Label Encoder.
  - o **Model Processing:** The encoded inputs are introduced into the neural network based on LSTM. The model analyses the sequence and generates forecasted values.
  - o **Decoding:** The numerical results are transformed back into recognizable categories like area of study, educational qualification, and job title. The system achieves high precision by utilizing a trained model that has gained insights from diverse student profiles and career pathways.
5. **Result Display Module** Following the prediction, the outcomes are shown to the user in an appealing visual layout. The module employs Bootstrap cards to organize the results clearly—showcasing the suggested area of study, degree, and profession.

## VI. SYSTEM SCREENSHOTS

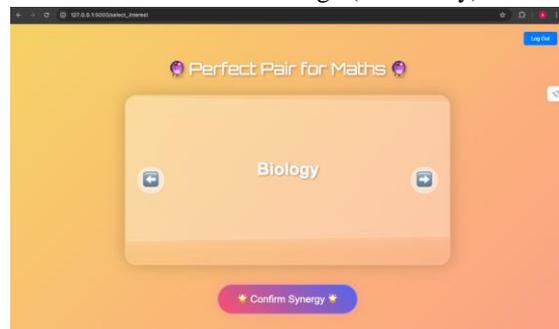
Login Page



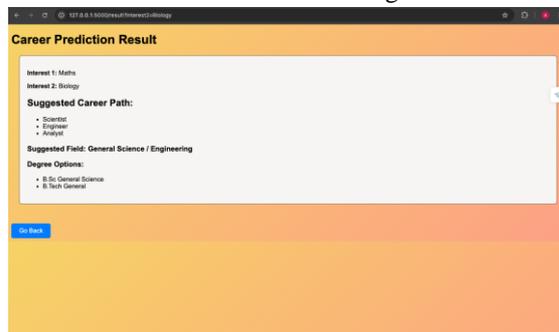
Interest Selection Page (Primary)



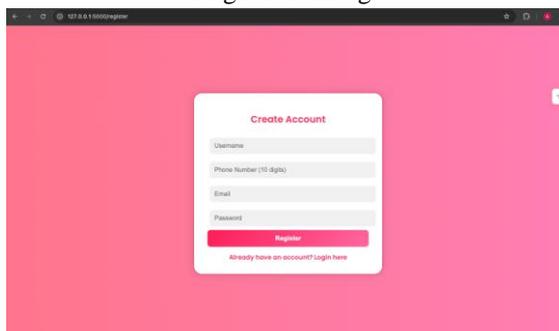
Interest Selection Page (Secondary)



Prediction Result Page



Registration Page



## VII. CONCLUSION

This project offers a solid solution that uses deep learning to predict career paths based on student choices. It increases the thrill and effectiveness of academic preparation by fusing modern machine learning with an entertaining, user-friendly interface.

Achievements:

- Selection by the swiping technique;
- LSTM-driven prediction
- Real-time validation
- Output that is easily comprehensible by humans

Limitations:

- Limited to pre-existing interest correlations
- No support for many languages
- No mobile optimisation

Future Enhancements:

- Additional interest categories and combinations should be introduced.
- Feedback loops should be included.
- Multiple languages should be supported.
- Based on the results, colleges should be advised.

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