B.Tech Branch Selection Prediction System

This project, titled "B.Tech Branch Selection Prediction System," is a machine learning-based web application designed to assist
intermediate students in selecting the most suitable engineering branch based on their academic performance and interests.

The system predicts the recommended branch using subject-wise marks, board information, gender, and extracurricular scores.
It leverages data analytics and machine learning to make personalized, data-driven recommendations.

Objective:

The primary objective of this system is to simplify the decision-making process for students by providing accurate
predictions of the most appropriate engineering branch based on their performance in various subjects.

System Features:

1. User Registration and Login: Secure authentication system for students to sign up and log in.
2. Marks Entry Module: Allows students to enter marks for Mathematics, Physics, Chemistry, Biology, and English.
3. Data Processing: Computes averages, PCM scores, and STEM-based metrics for prediction.
4. Prediction Module: Uses a trained Random Forest classifier to recommend top engineering branches.
5. Result Visualization: Displays top 3 branches with probabilities for easy understanding.
6. Course Information: Provides information about each engineering branch and related career opportunities.
7. Admin and Student Interface: User-friendly design developed with Streamlit for interaction.

Technology Stack:

- Programming Language: Python
- Framework: Streamlit
- Libraries: scikit-learn, pandas, numpy, joblib, matplotlib
- ML Model: RandomForestClassifier
- Frontend Interface: Streamlit-based web app
- Environment: Jupyter Notebook

Modules and Functionalities:

1. Signup and Login Page: Manages user accounts securely.
2. Add Marks Page: Accepts student marks and extracurricular scores.
3. Average Calculation Page: Displays subject-wise and overall averages.
4. Branch Recommendation Page: Predicts top engineering branches.
5. Course Details Page: Shows available courses and specializations.
6. Final Recommendation Page: Guides students to choose the best branch for their career.

Machine Learning Process:

1. Data Collection: Collects or generates student performance data.
2. Preprocessing: Handles missing values, scales numeric features, and encodes categorical variables.
3. Model Training: Trains a RandomForestClassifier to predict branches based on subject scores.
4. Evaluation: Assesses model accuracy and fine-tunes hyperparameters.
5. Deployment: Integrates trained model into a Streamlit web interface for real-time predictions.

Project Outcome:

The developed system successfully predicts the top engineering branches that match a student's academic profile.
It enhances decision-making for students and institutions, providing data-driven insights.
The model achieves high accuracy and presents results in a clear, interactive interface.

Future Enhancements:

- Integration with college databases for seat allocation suggestions.
- Addition of personality-based and aptitude-based branch recommendations.
- Integration of live data and student feedback loops for better model accuracy.
- Deployment on cloud platforms (AWS, GCP, or Azure) for scalability.

Conclusion:

The B.Tech Branch Selection Prediction System bridges the gap between student performance data

and smart career choices. It is a blend of data science and educational analytics designed
to help students make confident, informed decisions about their engineering careers.