Research Proposal: Enhancing Student Education Outcomes

1. Introduction:

Education is a critical driver of socio-economic development, and ensuring high school completion rates is pivotal for individual and societal advancement. However, in many developing countries, challenges such as economic constraints, cultural factors, the value system of the society and inadequate infrastructure contribute to lower school completion rates. This research aims to predict school completion rates in developing countries using advanced data science techniques. By understanding the factors influencing school completion, policymakers can design targeted interventions to enhance educational outcomes.

2. References and Ideas:

In the previous two cohorts, the teams worked on creating an early warning system that can help identify why and where students are at risk of dropping out of school to inform interventions, including the provision of resources.

We aim to analyze and predict completion rates based on factors that can affect student's education such as the literacy rate of the society, pupil-to-teacher ratio, trained teachers in primary education, unemployment, and government expenditure on education.

3. Problem Statement

The central challenge addressed in this research is to not only predict whether a student will complete their education or drop out but also to delve deeper into the reasons behind potential dropout scenarios. This multifaceted approach involves developing predictive models for individual student outcomes, **identifying key variable**s influencing completion rates, and **proposing targeted interventions** to address these challenges.

4. Objectives

- Identify and analyze the **root causes** and key variables contributing to potential student dropout.
- Evaluate the effectiveness of existing education policies in mitigating dropout risks.
- Provide actionable and targeted recommendations to enhance student completion rates by addressing specific challenges identified through the predictive models.

5. Methodology:

5.1 Datasets:

- The World Bank data on Education - https://data.worldbank.org/topic/4

- Higher Education Predictors of Student Retention Data - https://www.kaggle.com/datasets/thedevastator/higher-education-predictors-of-student-retention/data

5.2 Data Analysis and Modelling:

- Apply advanced data cleaning and preprocessing techniques to handle missing values and outliers.
- Utilize statistical methods to identify correlations between a broader set of variables and their impact on individual student completion rates.
- Conduct detailed exploratory data analysis to uncover nuanced trends and patterns associated with potential dropouts.
- Implement machine learning algorithms for predicting individual student completion rates, considering a holistic set of factors.

5.3 Intervention Assessment:

- Extend the analysis to assess the reasons behind predicted dropout scenarios.
- Evaluate the effectiveness of existing policies in addressing identified challenges.
- Propose targeted interventions and policy improvements based on the predictive models and root cause analysis.

5.4 Solution Deployment:

Develop an interactive and user-friendly Streamlit web application to deploy the enhanced predictive model and intervention assessment tools.

6. Expected Outcomes:

- Evaluation of existing policies and recommendations for improvement.
- In-depth understanding of the root causes and key variables influencing student dropout.
- Deployment of a comprehensive framework for predicting and addressing student dropout risks.

7. Conclusion:

This project aims to not only forecast student completion rates but also to empower educators and policymakers with insights into the specific challenges faced by individual students.
By adopting a holistic approach that combines predictive modelling with root cause analysis, the proposed framework provides a robust foundation for designing tailored interventions and policy enhancements to promote educational success on an individual level.