Student Performance Prediction Using AI and Deep Learning

Abstract

Predicting student performance is vital for personalized education and early intervention. Traditional statistical models fail to capture complex relationships between learning behaviors, psychological factors, and academic outcomes. This project introduces an **AI-based deep learning system** that employs **Graph Neural Networks (GNNs) and Transformer-based architectures** to predict student performance dynamically.

The dataset includes academic records, attendance logs, engagement in online courses, and sentiment analysis from student feedback. A **multi-modal AI model** combines textual data (student feedback), numerical data (grades and attendance), and visual data (handwritten assignments) to enhance prediction accuracy.

A **self-learning AI tutor** using **reinforcement learning and neural collaborative filtering** personalizes study recommendations for at-risk students. The model is fine-tuned using **contrastive learning** to differentiate between high-performing and struggling students effectively. The future scope includes integrating **AI-driven virtual mentors** and **emotion recognition models** to detect student stress levels, enabling a proactive approach to academic support.