Report

On

AI Powered Personalized Tutor System

By

Team Runtime Terrors

Mayuresh Ambrale

Kaveri Badakh

Samiksha Chougule

Under the guidance

of

Mrs.Sarita Sapkal

for

Intel Unnati Industrial Training 2025

Abstract

This project focuses on the design and development of an intelligent, adaptive online learning platform for K–12 students across India. It leverages the power of artificial intelligence and machine learning to create personalized learning experiences tailored to each student's pace and understanding. The platform predicts student performance, recommends suitable curriculum levels, and delivers targeted educational content to help learners improve effectively. To build accurate prediction models, synthetic data was used to simulate diverse learning behaviors and outcomes. These models can forecast assessment results, recommend appropriate learning paths, and identify students who may need additional support. By enabling proactive interventions, the system empowers educators to make timely, data-driven decisions that contribute to continuous academic progress. The platform aims to bridge learning gaps, enhance student engagement, and make quality education more accessible and efficient across varied learning environments. Through its intelligent design, it ensures that every student receives the right support at the right time, fostering long-term academic success.

Contents

Chapter 1

Introduction

Digital learning platforms have significantly transformed education in recent years by making learning more accessible and flexible. However, many existing systems still follow a one-size-fits-all approach, lacking the ability to adapt to individual student needs. This often results in inconsistent learning outcomes and disengagement among students with different learning styles and paces.

This project aims to address these limitations by developing an intelligent, adaptive learning platform designed specifically for K–12 students. By leveraging machine learning techniques, the platform personalizes educational content, monitors student progress, and predicts academic outcomes. It adjusts the learning path based on each student's strengths, weaknesses, and performance data. The goal is to create a more inclusive, effective, and engaging learning experience. By offering tailored resources and timely support, the platform ensures that every student receives the guidance they need to succeed, making quality education more interactive and impactful for learners across diverse backgrounds and abilities.

1.1   Motivation

With the rapid shift toward online education, there is a growing need to move from content-centric to student-centric learning approaches. Traditional platforms often overlook individual needs, making it essential to create systems that adapt to each learner's pace and understanding.

The motivation behind this project lies in enabling personalized learning at scale through the use of AI. By leveraging predictive analytics, the platform can enhance student outcomes, offer timely support, and ensure a more engaging and effective learning experience.

Additionally, the platform aims to assist educators in identifying students who require intervention

and support. It also seeks to promote equal learning opportunities, ensuring that students across different regions and backgrounds have access to quality, tailored education.

1.2   Problem Definition

Students across India encounter various challenges in the digital education space, particularly when it comes to personalization. Many platforms fail to adapt to individual learning speeds, comprehension levels, and preferred learning styles, leaving students disengaged and struggling to keep up or stay motivated.

Another major issue is the lack of real-time feedback and guidance. Without timely insights into their performance, students are often unaware of their strengths and weaknesses, making it difficult to improve or stay on the right academic path. Additionally, choosing the appropriate level of study material or course is often confusing and unstructured.

This project aims to resolve these challenges through an AI-enabled learning platform that offers personalized content, continuous progress tracking, and intelligent performance predictions. By providing actionable feedback and tailored recommendations, the system empowers students with the tools they need to take charge of their learning journey and achieve better educational outcomes.

Chapter 2

Proposed Solution

2.1   Project Specifications

To address the challenges in digital education, a multi-phase solution was developed, combining synthetic data generation, exploratory analysis, and machine learning modeling to enable intelligent, personalized learning.

Phase 1: Data Generation & Preparation:

Synthetic data was created using the Faker library to simulate realistic student profiles. Key attributes included:

- Name, Age, Gender, State, Parent Occupation, Earning Class

- Time Spent on Learning, IQ, Course Level, Material Level, Assessment Score

To mimic real-world data variability, missing values and outliers were intentionally introduced. A binary label, "Promotion", was engineered based on performance scores to indicate student progress.

Phase 2: Exploratory Data Analysis (EDA):

Comprehensive data analysis was performed using descriptive statistics and visualizations such as:

- Histograms, scatter plots, box plots, and bar charts

- Correlation matrix to identify relationships between features

- Assessment of missing values and outliers for data quality improvement

Phase 3: Machine Learning Modeling:

Assessment Score Prediction:

- **Random Forest Regressor:**

  - MAE: 0.648

  - MSE: 0.725

  - R^2 Score: 0.330

- **XGBoost Regressor:**

  - MAE: 0.754

  - MSE: 0.906

  - R^2 Score: 0.164

Curriculum Level Prediction:

- **Random Forest Classifier:**

  - Accuracy: 100%

  - Cross-Validation Scores: [1.0, 1.0, 1.0, 1.0, 1.0]

Phase 4: Platform Interaction and Output:

The system accepts user input and returns intelligent predictions.

Example Input:

- Time Spent per Day: 6.0

- IQ: 100

- Course Level: Advanced

- Earning Class: High

- Material Level: Basic

- State: Andhra Pradesh

- Parent Occupation: Teacher

Predicted Output:

- Predicted Assessment Score: 0.30

- Recommended Curriculum Level: Advanced
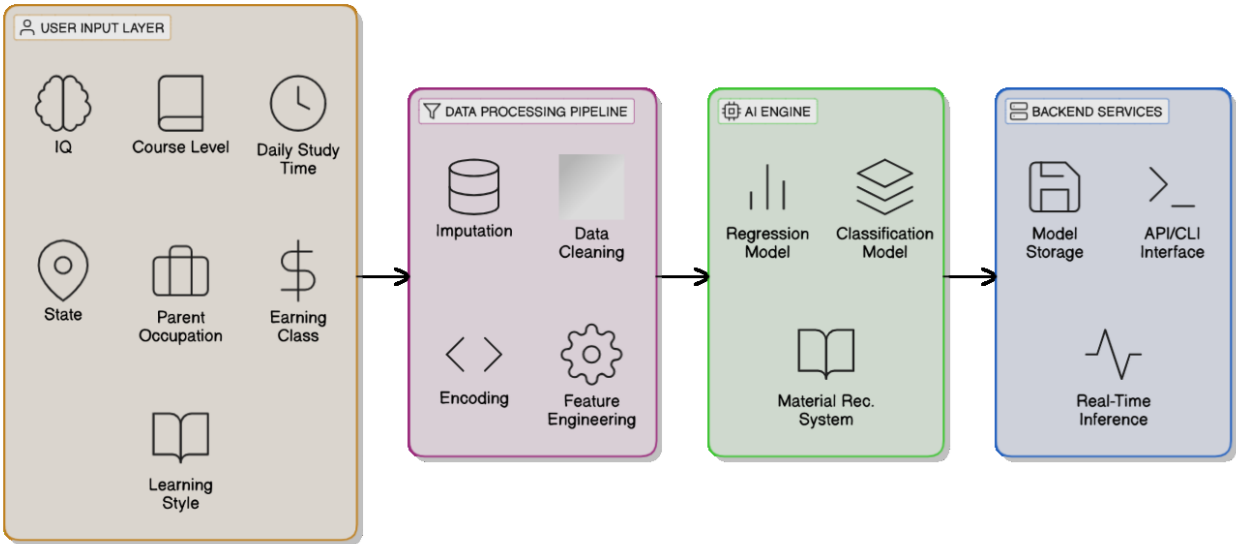
2.2 Proposed Architecture

Figure 2.1: Project Architecture Diagram

Chapter 3

Conclusion

3.1 Future Enhancements

Future improvements can significantly expand the system's capabilities and impact. Some possible directions include:

- Incorporating real student performance data from educational institutions to improve model accuracy and reliability.

- Developing a dynamic learning platform that adapts study materials and difficulty levels based on real-time student performance.

- Integrating computer vision and NLP techniques to assess students' emotional state and engagement during the learning process.

- Implementing a feedback system where predictions are validated and used to retrain the models periodically.

- Creating a user-friendly web and mobile application to increase accessibility and interaction with the system.

- Expanding support for multiple languages to cater to a diverse student population across different regions.

3.2 Applications

- Personalized learning platforms can deliver adaptive content based on individual learner profiles.

- Predictive analytics help forecast student performance and enable timely interventions.

- Assists in curriculum planning by recommending appropriate course levels tailored to student abilities.

- Can be integrated into existing EdTech tools or LMS platforms to enhance personalization.

- Supports student retention by identifying at-risk students and suggesting proactive support measures.

- Provides actionable insights to educators and parents for better student monitoring and guidance.

- Enhances remote learning experiences through intelligent, data-driven content delivery.

- Aids in creating customized learning paths for students with special needs or diverse backgrounds.

3.3   Concluding Overview

The proposed system establishes a robust, data-driven foundation for delivering truly personalized educational experiences. By leveraging intelligent modeling of student behavior, learning patterns, and academic performance, the platform empowers both learners and educators to make well-informed, strategic decisions. The integrated machine learning models demonstrate strong performance in accurately predicting assessment outcomes and recommending curriculum levels aligned with individual capabilities. Designed with scalability and flexibility in mind, the system is well-suited for real-world deployment across diverse educational environments. Its modular architecture allows for seamless integration into existing learning management systems and supports future enhancements such as intelligent material recommendation engines, real-time feedback mechanisms, and multilingual accessibility. This forward-thinking approach not only promotes adaptive learning but also ensures inclusivity and continuous academic growth, making it a valuable tool for transforming the digital education landscape.