StudyYourWay:

AI-powered Personalized Learning Platform for Quality Education

INTRODUCTION

- Our project addresses **Sustainable Development Goal 4** by developing an AI-powered learning platform that adapts to each student's unique needs. By offering personalized learning paths, resources, and assessments, particularly targeting underprivileged children, we aim to improve educational outcomes globally. This initiative responds to the critical need for equitable access to quality education, leveraging advanced technology to cater to diverse learning styles and individual capabilities. Through IBM Watson Assistant, our platform ensures scalable, reliable support, empowering students with the tools they need to succeed academically and contribute positively to their communities, fostering a future where education is accessible to all, regardless of background.

PROBLEM STATEMENT

- Despite global efforts, access to quality education remains unequal, disproportionately affecting underprivileged children. Our initiative aims to bridge this gap by developing an AI-powered personalized learning platform. This platform will tailor educational experiences, resources, and assessments to meet the diverse needs of students, particularly those from disadvantaged backgrounds. By leveraging advanced technology like IBM Watson Assistant, we seek to enhance educational outcomes and empower every child with equitable access to effective learning opportunities, thereby contributing towards achieving SDG 4: Quality Education.

OBJECTIVES

- The primary objective of this project is to develop an AI-powered learning platform that:

- **Personalizes Learning Paths:** Adapts educational content and activities based on each student's learning style, pace, and capabilities.
- **Provides Customized Resources:** Offers a diverse range of learning materials, including videos, interactive lessons, and assessments tailored to individual needs.
- **Improves Educational Outcomes:** Utilizes data analytics to monitor student progress, identify areas for improvement, and provide targeted interventions.
- **Supports Underprivileged Students:** Specifically focuses on bridging the educational gap by providing equitable access to high-quality learning experiences.

WHY THIS PROBLEM STATEMENT

- **Educational Inequity:** There exists a significant gap in educational outcomes between privileged and underprivileged students. Access to personalized learning can help bridge this gap by providing tailored support that meets the specific needs of each student.
- **Diverse Learning Needs:** Every student learns differently. Traditional educational systems often fail to accommodate these diverse learning styles and paces, leading to disengagement and underachievement, especially among underprivileged students who may not receive adequate support.
- **Technological Advancements:** Advances in artificial intelligence and machine learning present an opportunity to revolutionize education. These technologies can analyze vast amounts of data to personalize learning experiences, making education more effective and engaging.
- **Impact on Future Opportunities:** Education plays a critical role in shaping future opportunities for individuals. By enhancing educational outcomes through personalized learning, we can empower underprivileged children to break the cycle of poverty and achieve their full potential.
- **Global Relevance:** Achieving Sustainable Development Goal 4 (Quality Education) requires addressing educational disparities worldwide. A scalable, AI-driven solution can have a global impact by improving educational access and quality for marginalized communities globally.
- **Social Responsibility:** Ensuring equitable access to quality education is not just a moral imperative but also a societal responsibility. By investing in educational equity, we contribute to building more inclusive societies and fostering economic development.

WORKING OF OUR MODEL:

- **Chatbot Creation:** A Watson Assistant resource was created for a web-based chatbot. The chatbot was trained with relevant questions and answers. Once the chatbot was completed, it was previewed and refined before publishing. Upon publishing, a JavaScript code snippet for integration with the HTML code of the website was provided.
- **ML Model Creation:** IBM Watson Studio was used to classify students as fast or slow learners using features such as age, previous marks, current percentage, study hours, and extracurricular activities. The process began by ingesting and preprocessing the dataset to handle missing values and necessary transformations. Key features were identified and transformed to enhance model performance. Suitable binary classification algorithms like Logistic Regression or Decision Trees were selected, and the model was trained using split datasets. The model's effectiveness was evaluated with metrics like accuracy, precision, recall, and F1-score.
- **Integration to the Website:** After achieving satisfactory performance, the model was deployed as a web service for real-time predictions .The API and endpoint URL for the model were obtained and integrated into the website using Node.js and Express. Depending on the output, users are redirected to the respective courses page for slow or fast learners accordingly, enabling educators to identify fast and slow learners efficiently.

FEATURES

- **Personalized Learning Paths:** Tailors educational content based on individual student strengths and weaknesses.
- **Adaptive Assessments:** Dynamically adjusts assessment difficulty to match student progress and understanding.
- **Rich Learning Resources:** Provides diverse resources such as videos, interactive simulations, and quizzes.
- **Progress Tracking:** Monitors student performance and provides detailed analytics for educators and parents.
- **Feedback and Recommendations:** Offers personalized feedback and recommends additional learning materials based on performance.
- **Accessibility:** Ensures accessibility for students with varying technological capabilities and resources.
- **Support for Educators:** Provides tools for educators to create and manage personalized learning experiences.
- **Integration with IBM Watson Assistant:** Utilizes advanced AI capabilities to enhance student interaction and learning outcomes.

TECHNICAL IMPLEMENTATION (TOOLS)

Frontend Implementation

- HTML/CSS/JavaScript: Implemented multiple HTML files (home.html,login.html, personalized-courses.html, slow-learners.html) with basic styling using CSS for layout and aesthetics.
- User Interface (UI): Designed a responsive UI for optimal viewing across devices , ensuring a seamless user experience.
- IBM Watson Assistant Integration: Integrated IBM Watson Assistant chatbot to provide personalized assistance and support to users across different pages of the application.

Backend Implementation

- Node.js with Express: Developed a backend server (server.js) using Node.js with Express framework to handle API requests and serve static HTML files.

- Implemented CORS handling for cross-origin requests and middleware for JSON parsing.
- IBM Cloud Services Integration: Integrated IBM IAM for authentication to secure endpoints (/get-token).o Utilized Watson Machine Learning service for making predictions based on user input (/ml-predictions).

API Endpoints:

- /get-token: Retrieves IBM IAM token for authentication.
- /ml-predictions: Sends user data to Watson ML service for predictions andreturns results to frontend for user guidance.

Additional Enhancements:

Security Measures:

- Implemented HTTPS for secure data transmission.
- Validated user inputs on the backend to prevent malicious attacks.

Performance Optimization:

- Optimized frontend assets and backend code for improved loading times andoverall performance.

Screenshots

Fig 1: Data and the Token value received from the IBM Watson Machine Learning Model using API key and public endpoint

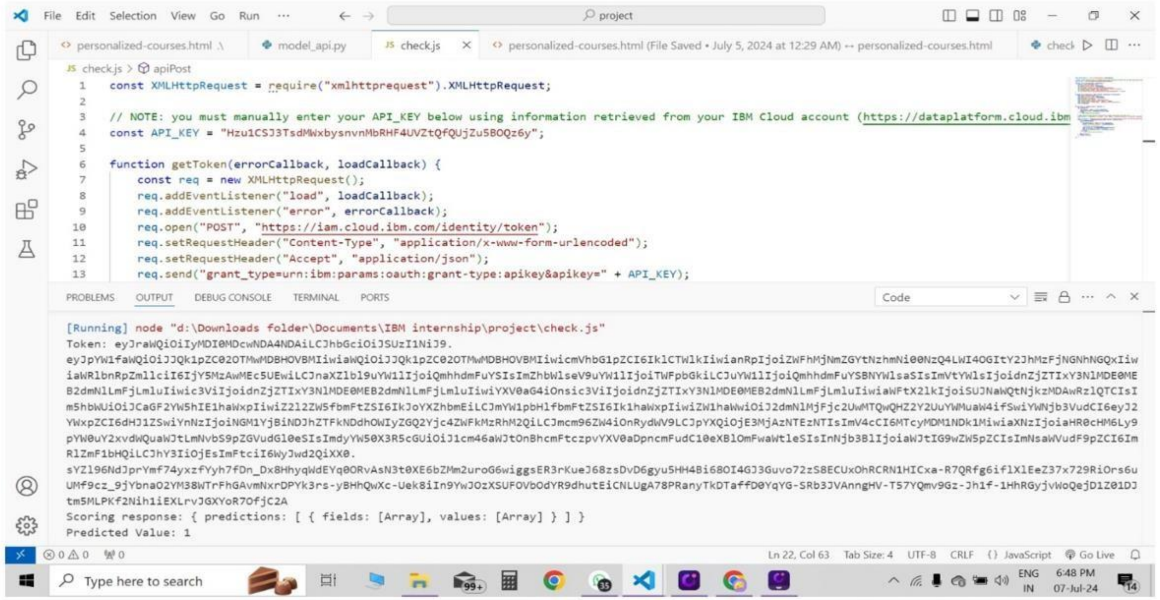

Fig 2: Prediction made as 0 or 1 by the IBM ML model

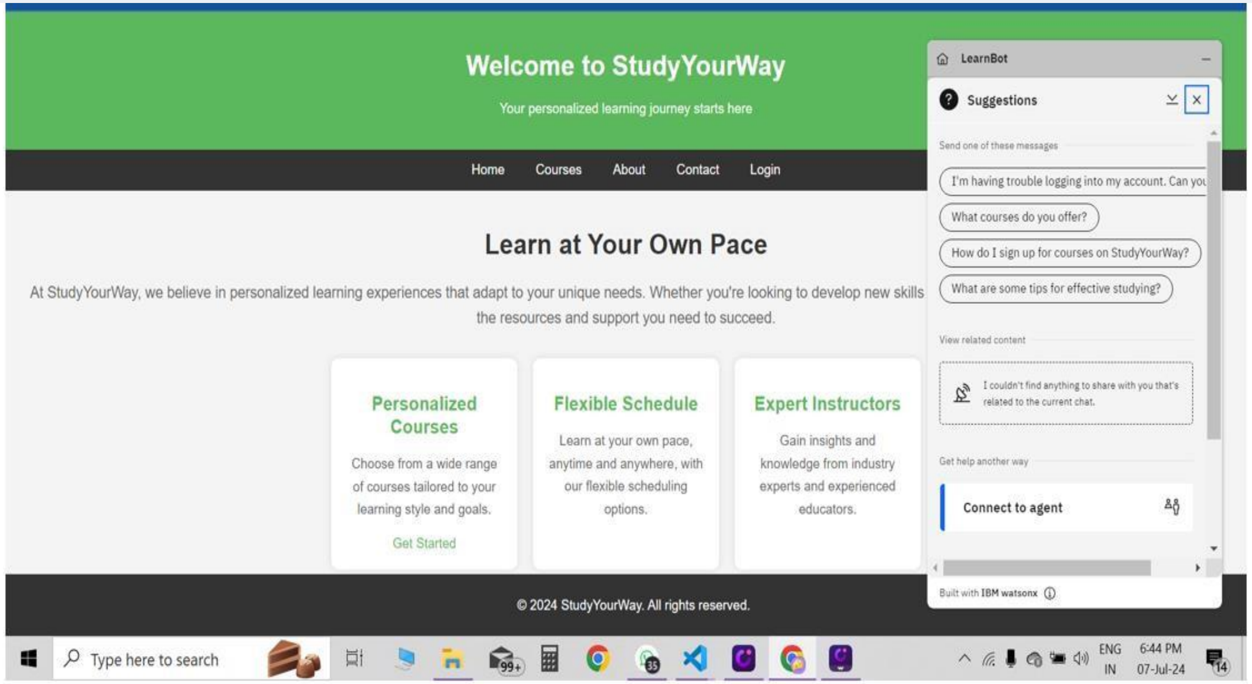

Fig 3: IBM chat bot

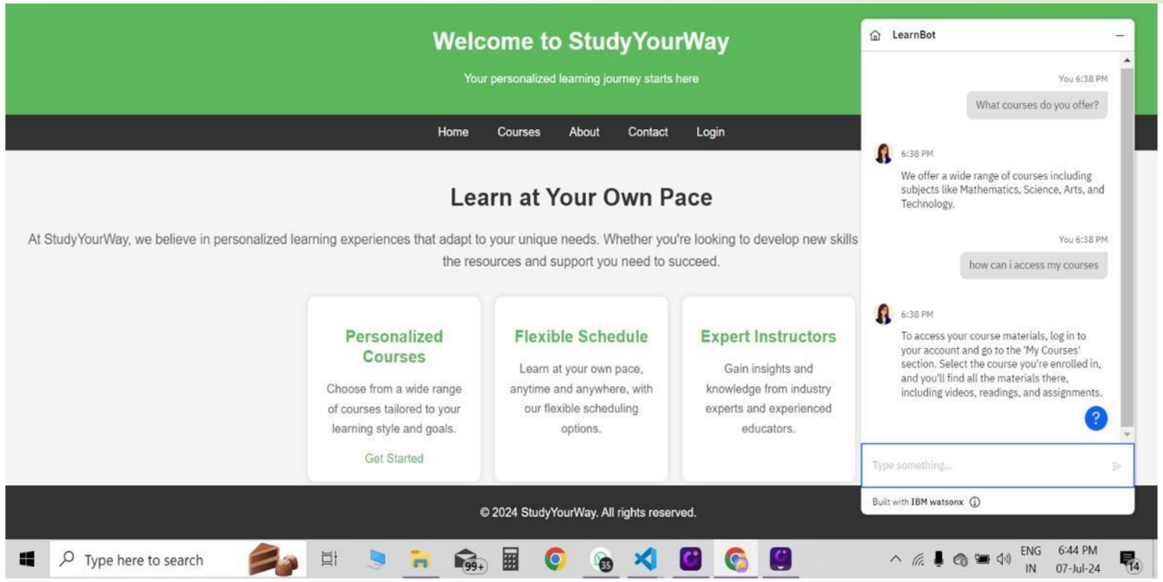

Fig 4: IBM Chat bot

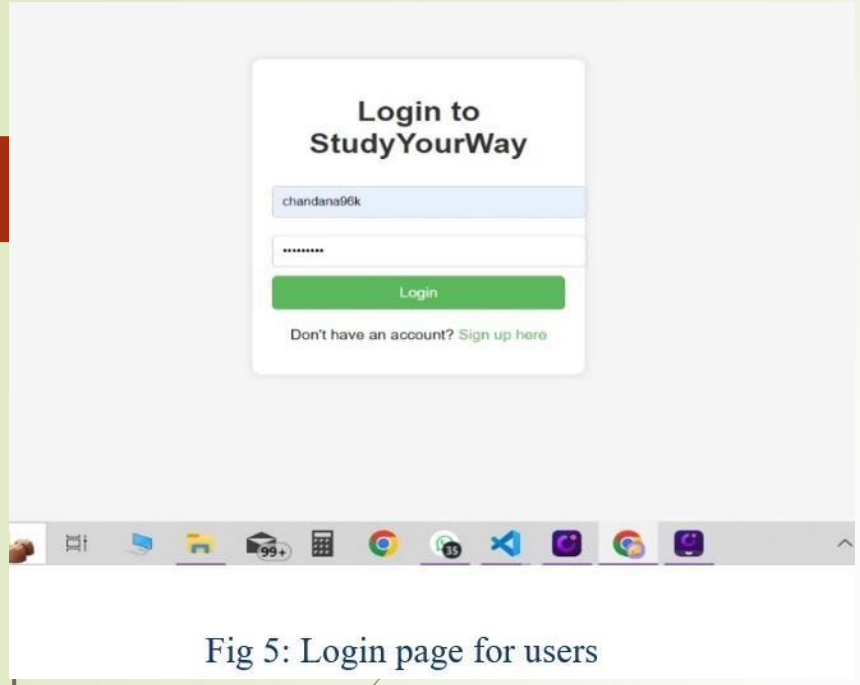

Fig 5: Login page for users

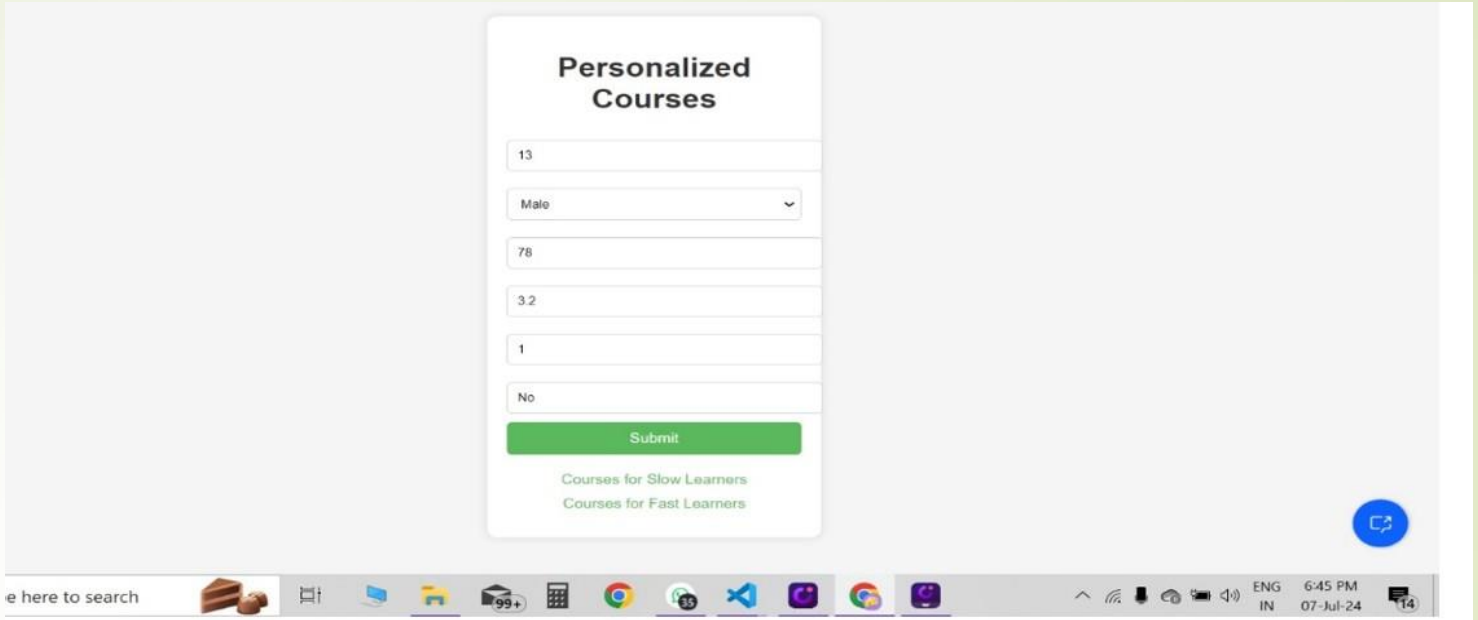

Fig 6: Personalized Courses- collecting data from the users to make predictions

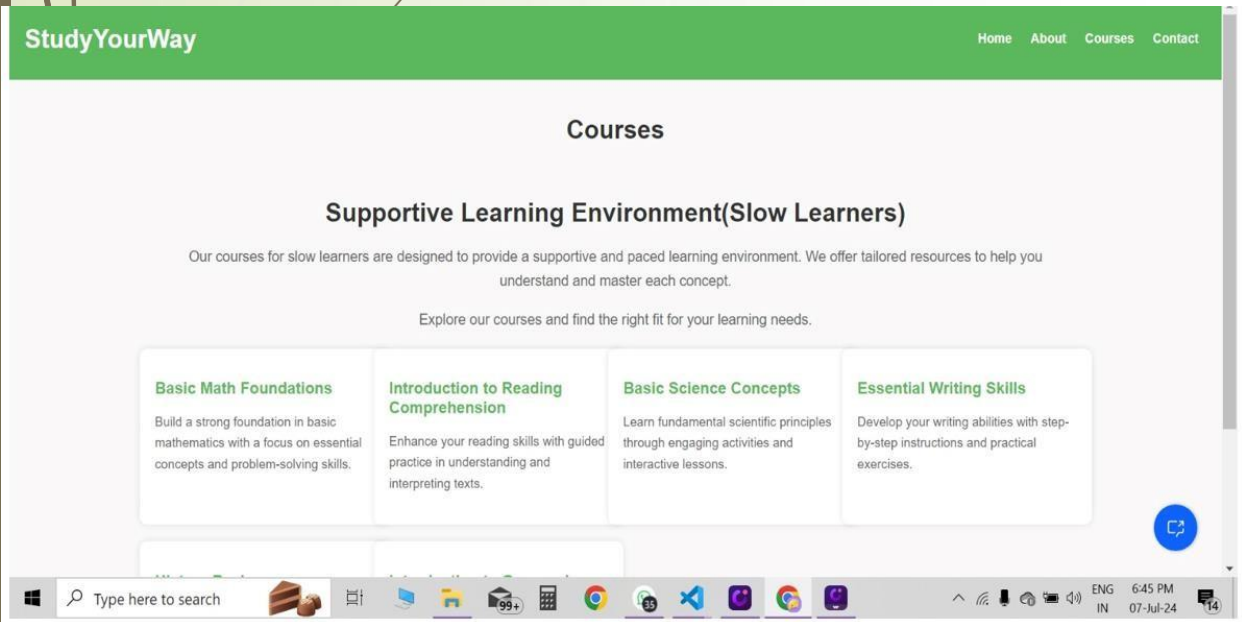

Fig 7: Courses curated for Slow Learners

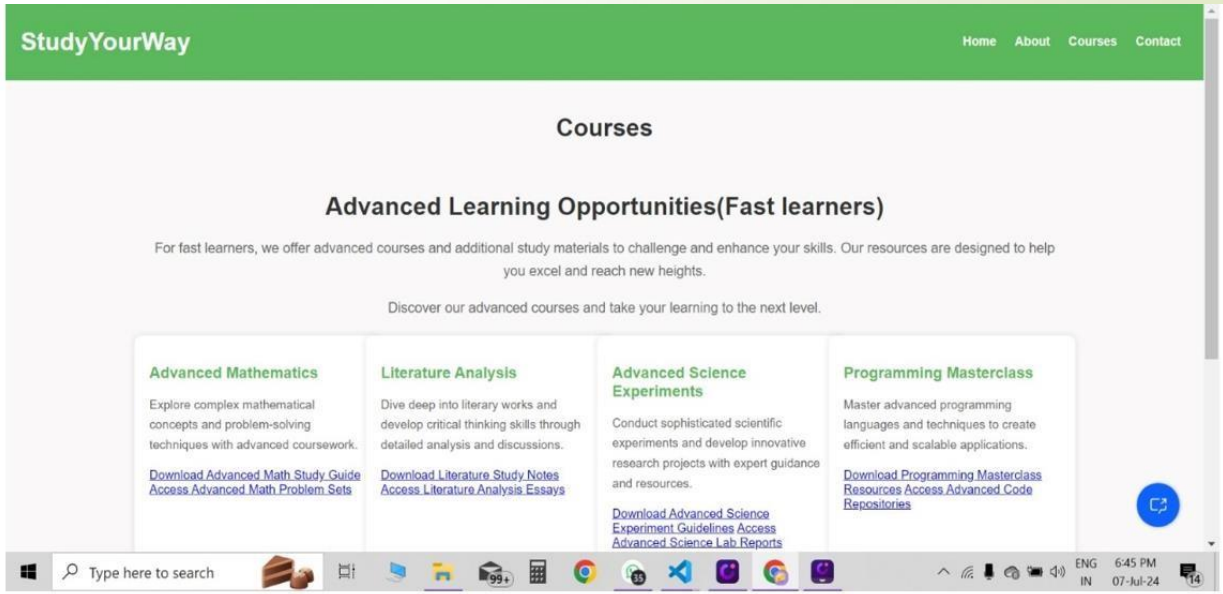

Fig 8: Courses curated for Fast Learners

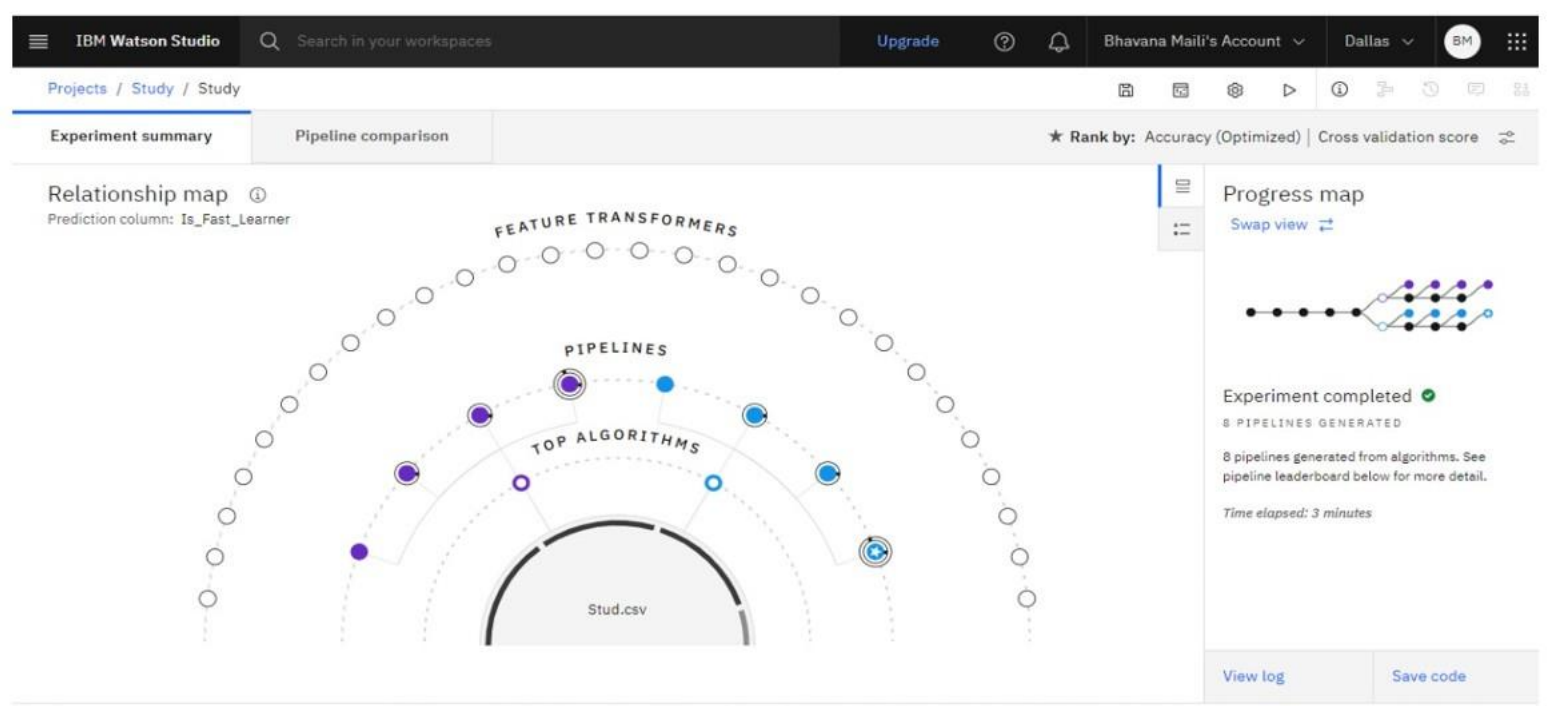

Fig 9: ML model built on IBM Watson Machine Learning

Demo video link:

https://drive.google.com/file/d/1YLQmErbpP2SB2aVALHDqdxqzBnQiohNU/view?usp=sharing

CONCLUSION

- The AI-powered personalized learning platform leveraging IBM Watson Assistant represents a pivotal advancement towards achieving SDG 4: Quality Education. By tailoring learning experiences to individual student needs and providing comprehensive resources, this platform aims to enhance educational outcomes, especially for underprivileged children. IBM Watson Assistant's robust AI capabilities ensure scalability, efficiency, and user-friendly interaction, promising equitable access to quality education worldwide. This initiative not only addresses current educational challenges but also fosters a future where every learner can thrive, regardless of their background or circumstances, making significant strides towards a more inclusive and sustainable educational landscape.