

StudyYourWay:

AI-powered Personalized Learning
Platform for Quality Education



INTRODUCTION

Our project addresses SDG 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?

Addressing the need for an AI-powered personalized learning platform for underprivileged children is crucial for several reasons:

1. **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.
2. **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.
3. **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.
4. **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.
5. **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.
6. **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.

Solution: Personalized Learning Platform for Quality Education

PROBLEM OVERVIEW:

In today's educational landscape, many students, especially those from underprivileged backgrounds, face significant challenges. They often lack access to tailored educational resources and struggle to receive personalized support that meets their unique learning needs. Traditional educational systems typically adopt a one-size-fits-all approach, which fails to address the diverse learning requirements of individual students.

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:

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).
 - 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 and returns 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 and overall performance.

- **Testing and Debugging:**
 - Conducted thorough testing to ensure functionality across various scenarios.

Used debugging tools to identify and resolve issues promptly.

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.

WHY IBM WATSON ASSISTANT:

- **Natural Language Processing (NLP):** Watson Assistant excels in understanding and processing natural language, allowing users to interact with the platform conversationally. This capability is crucial for delivering a user-friendly experience, especially in educational contexts where students may have diverse language skills.
- **AI Capabilities:** It leverages AI to continuously learn and improve interactions over time. This means the chatbot can provide more accurate responses and personalized

recommendations based on user interactions and data.

- **Integration with IBM Cloud:** Watson Assistant integrates seamlessly with other IBM Cloud services, facilitating scalability, reliability, and security. This is beneficial for handling potentially large volumes of user queries and ensuring data privacy compliance.
- **Multi-channel Deployment:** The chatbot can be deployed across various channels such as websites, mobile apps, and messaging platforms. This versatility ensures that students can access educational support wherever they are, enhancing accessibility.
- **Developer-Friendly:** IBM Watson Assistant provides robust APIs and SDKs that simplify integration with existing systems and custom applications. This flexibility allows developers to customize and extend the chatbot's capabilities as needed.
- **Analytics and Insights:** It offers analytics tools to track user interactions and gain insights into user behavior and preferences. This data-driven approach helps in continuously optimizing the learning platform to better meet educational objectives.

CONCLUSION:

In 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.

DEMO VIDEO LINK:

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

SNAPSHOTS OF THE PROJECT:

```
Request Body: {"input_data": [{"fields": ["Age", "Gender", "Previous_Test_Scores", "Current_GPA", "Study_Hours_per_Day", "Extracurricular_Participation"]}, {"values": [[13, "Male", 78, 3.2, 1, "No"]]}]}
Token: eyJrakQioiIyMDIDM0DcwNDA4NDAlCJhbGciOiJSUzI1NiJ9.eyJpYW1faWQiOijJQk1pZC020TMwMDBHOVBMIIiwicmVhbG1pZCI6Ik1CTwIkIiwiianRpjoiYmQvNTVm2ItOTU1YtNjZmIxZjE1IiwiawRlbnRpZmlci6IjY5MzAwMEc5UEwiLCJnaXZ1b19uYW11IjoiQmhhdmfuYSIsImZhbwlseV9uYw11IjoiTWFpbGk1LCJuYw11IjoiQmhdmFuYSBNyWlsasIsImVtYwlsjoidnZjZTIXy3N1MDE0MEB2dmN1lmfjlmluiIwiic3ViTjoidnZjZTIXy3N1MDE0MEB2dmN1lmfjlmluiIwiawRlx21kIjoiSUJNaQtNjkzMDAwRzlQTCisIm5hbwUiOjCaGF2Yw5hIE1haWxpIiwiZ212ZW5fbmftZS16IkjoxYXZhbmEilCJmYw1pbh1fbmftZS16Ik1haWxpIiwiZw1haWwioid2dmN1Mjfj:c2UwMTQwQHZ2Y2UvYwMuaw4ifswiYwNnjb3VudC16eyj2YwkpZC16djh1ZSwiYnNZiJoinGM1YjBiNDJhZTFkNDdhOWIyZGQ2Yjc4ZwFkmzRhm2Q1LCJmc96Zw4iOnRydWV9LCJpYXQ1oje3MjAzNtc3NjUsImV4cCI6MTcyMDM2MTM2NSwiiaXNzIjoiiaHR0cHM6Ly9pYW0uYxvdWQuawjtLmNb9pZGVudgleeSiImdyYw50X3R5cGUioi1cm46awJtobhcmftczpvYXV0aDpncmfUdC10eXB10mFwawtLeSisInNjb381IjoiawJtIG9wZw5pZCisImNsawWvudF9pZC16ImRlzmF1bHq1CJhY3IiOjEsImFtcI6WlyJwd2QixX0.Sx4MpOH1bns_FbU2b1kM12YFmdwMSpD5ZGe83EY73-YGMw8Xr6AKSeSPYooF-ia71ECPUnlg8aV5jjTjve8LXgMrAb1jdby14FwzxCabZn-cRz16Ygg0oIeffHAAsYDf6Gokc5-3df4VXGeXovAugbgzj1c1s5180QQXne_1trVBfuvKR265hjwstj78nVOvgape3ieotrnnxBQp6jkkXUL2yqkGzT2cEZjVdsG1rtEnbzNFHGAC_NOLqREZLL2vXazMS-ZneetZ26vWE_p89Gxpwb/SPR_J2UxRQxLcgm37zmc1fc1HyUbxIOPdvitf-0H6QyznHs1VfpurRktQ
Data received from predictions API: { predictions: [ { fields: [Array], values: [Array] } ] }
Request Body: {"input_data": [{"fields": ["Age", "Gender", "Previous_Test_Scores", "Current_GPA", "Study_Hours_per_Day", "Extracurricular_Participation"]}, {"values": [[13, "Female", 90, 3.9, 2, "No"]]}]}
Token: eyJrakQioiIyMDIDM0DcwNDA4NDAlCJhbGciOiJSUzI1NiJ9.eyJpYW1faWQiOijJQk1pZC020TMwMDBHOVBMIIiwicmVhbG1pZCI6Ik1CTwIkIiwiianRpjoiN2M2M211Y2QtnWRkZi00NDEwLT1kMzEtN2F1MTk4M2Ri0TRm1IiwiawRlbnRpZmlci6IjY5MzAwMEc5UEwiLCJnaXZ1b19uYW11IjoiQmhhdmfuYSIsImZhbwlseV9uYw11IjoiTWFpbGk1LCJuYw11IjoiQmhdmFuYSBNyWlsasIsImVtYwlsjoidnZjZTIXy3N1MDE0MEB2dmN1lmfjlmluiIwiawRlx21kIjoiSUJNaQtNjkzMDAwRzlQTCisIm5hbwUiOjCaGF2Yw5hIE1haWxpIiwiZ212ZW5fbmftZS16IkjoxYXZhbmEilCJmYw1pbh1fbmftZS16Ik1haWxpIiwiZw1haWwioid2dmN1Mjfj:c2UwMTQwQHZ2Y2UvYwMuaw4ifswiYwNnjb3VudC16eyj2YwkpZC16djh1ZSwiYnNZiJoinGM1YjB1NDJhZTFkNDdhOWIyZGQ2Yjc4ZwFkmzRhm2Q1LCJmc96Zw4iOnRydWV9LCJpYXQ1oje3MjAzNtc30TUsImV4cCI6MTcyMDM2MTM5NSwiiaXNzIjoiiaHR0cHM6Ly9pYW0uYxvdWQuawjtLmNb9pZGVudgleeSiImdyYw50X3R5cGUioi1cm46awJtobhcmftczpvYXV0aDpncmfUdC10eXB10mFwawtLeSisInNjb381IjoiawJtIG9wZw5pZCisImNsawWvudF9pZC16ImRlzmF1bHq1CJhY3IiOjEsImFtcI6WlyJwd2QixX0.dx3vQvobdhpeDuzyHn1w0e6s03tyhpmoveUf5eb0MwE21Mw0vBTHLvsVlyNzDPpCejG-UqgeBf2YolWAvakz80pc13dJv9Mw1LQarqQ3291FYkdDHNzusHHUVII318eNv1lsBzrL8gPbTO328p4USJzeeyy01ycnmzzhd8triRp0Fu12xSO40macWb2j4nwNw5ndMxyhQ1ySkiy808do5EP4yEB6G08n0fxLkjGcJPwk0qPMqs_6fyJh7MwOfu4ni2Qcga535epv4FaZcawRgbz1QtBk0pICV-IaPmJlwu7ua0@0t_90u0uv4P7ew46CuN3rgOrFqGU37rApow
Data received from predictions API: { predictions: [ { fields: [Array], values: [Array] } ] }
PS D:\Downloads\Documents\IBM internship\project2> 
```

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

The screenshot shows a web browser with the URL 127.0.0.1:5500/home.html. The page title is "Home | StudyYourWay". The main content area features a green header "Welcome to StudyYourWay" and a sub-header "Your personalized learning journey starts here". Below this is a navigation bar with links to Home, Courses, About, Contact, and Login. A central section titled "Learn at Your Own Pace" contains text about personalized learning experiences and resources. Three call-to-action boxes are displayed: "Personalized Courses", "Flexible Schedule", and "Expert Instructors". The "Personalized Courses" box includes a "Get Started" button. The "Flexible Schedule" box includes a "Get Started" button. The "Expert Instructors" box includes a "Get Started" button. At the bottom, a copyright notice reads "© 2024 StudyYourWay. All rights reserved." On the right side, a sidebar titled "LearnBot" is open, showing a "Suggestions" section with several message bubbles: "I'm having trouble logging into my account. Can you help?", "What courses do you offer?", "How do I sign up for courses on StudyYourWay?", and "What are some tips for effective studying?". Below this is a "View related content" section with a message bubble: "I couldn't find anything to share with you that's related to the current chat.". At the bottom of the sidebar, there is a "Connect to agent" button and a note "Built with IBM watsonx". The browser toolbar at the top includes icons for Google, YouTube, Coding Ninjas, WhatsApp, Internshala Trainings, RPA Citizen Develop..., AWS AIML DeepRac..., IBM SkillsBuild, Acho | Resources, and All Bookmarks.

Fig 3: IBM chat bot

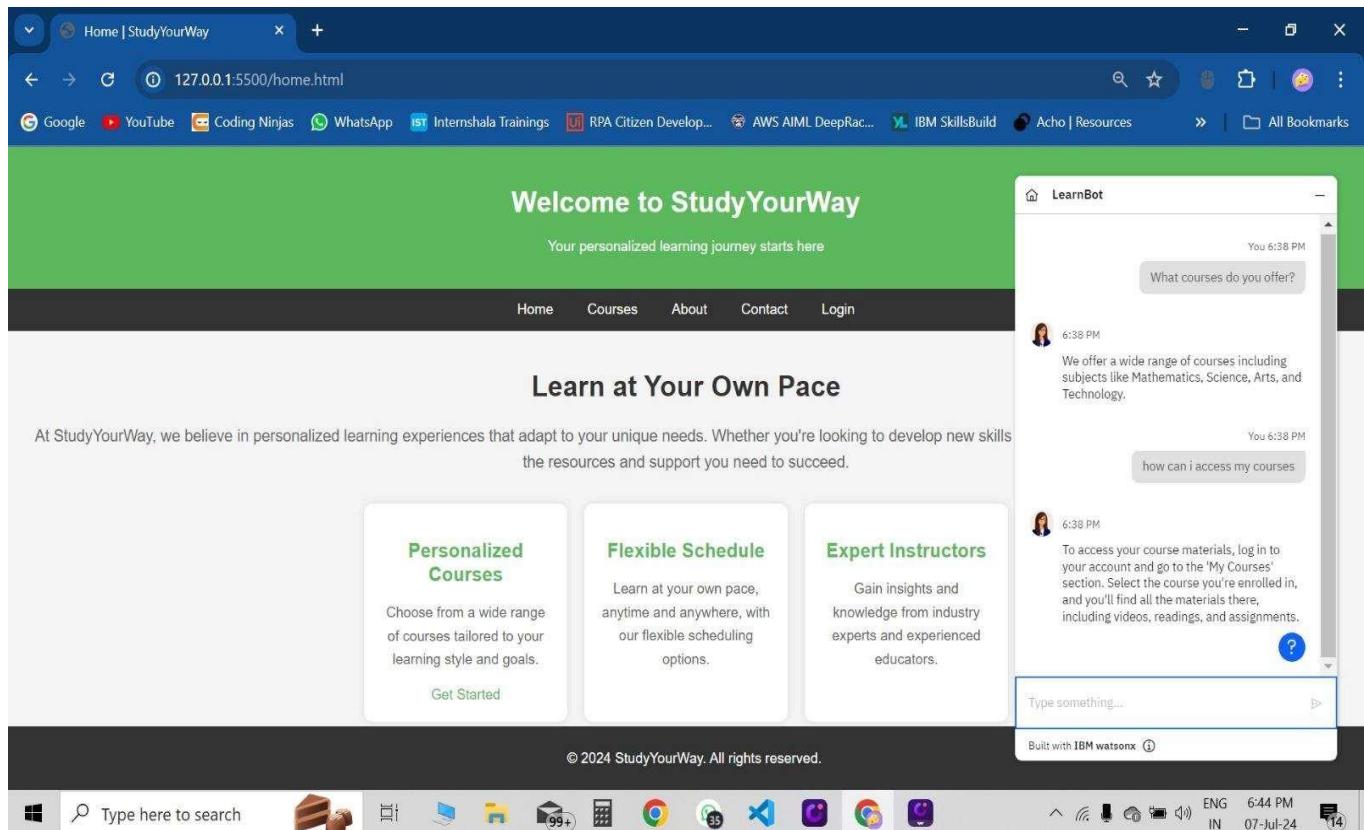


Fig 4: IBM Chat bot

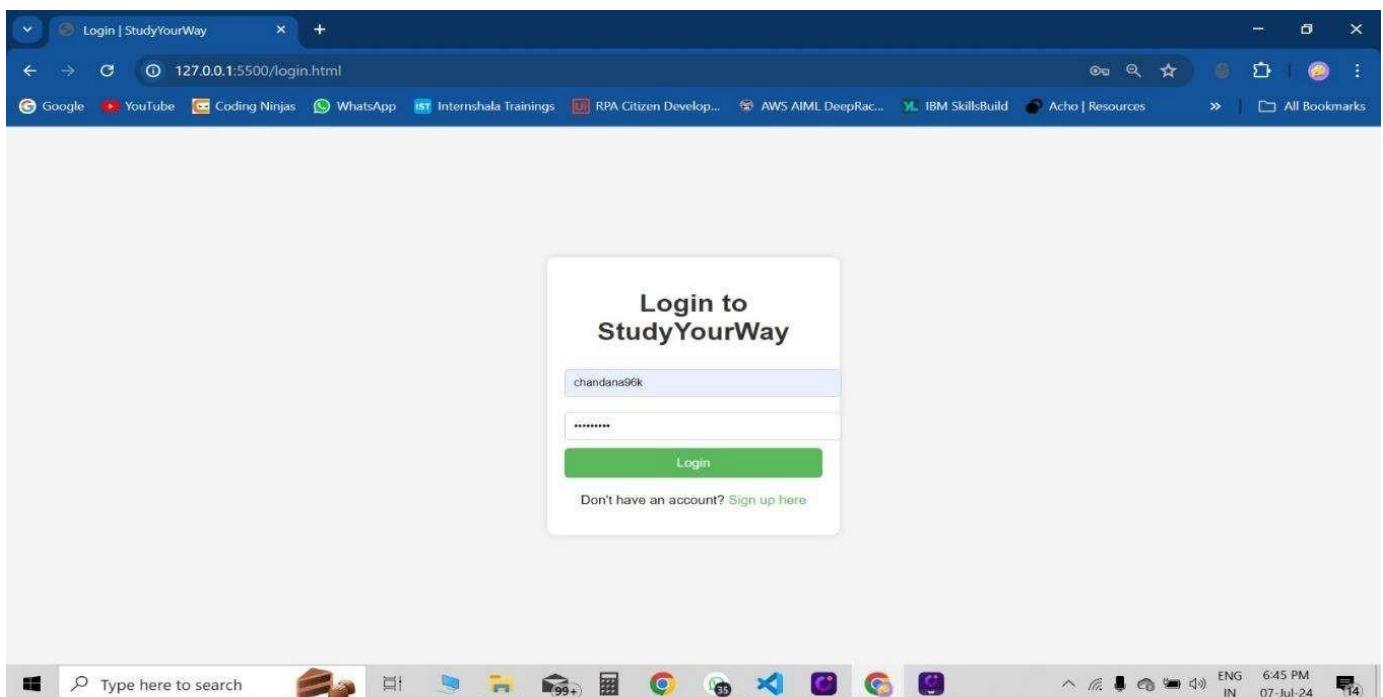


Fig 5: Login page for users

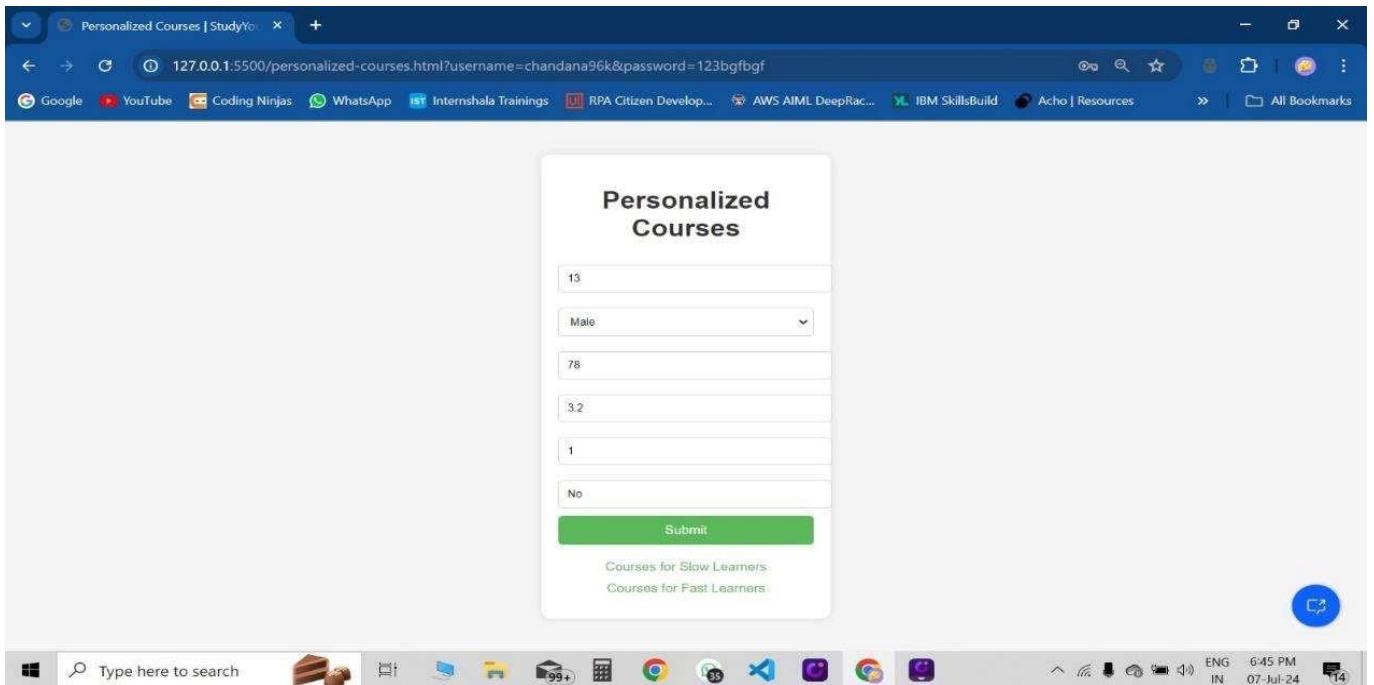


Fig 6: Personalized Courses- collecting data from the users to make predictions

Courses

Supportive Learning Environment(Slow Learners)

Our courses for slow learners are designed to provide a supportive and paced learning environment. We offer tailored resources to help you understand and master each concept.

Explore our courses and find the right fit for your learning needs.

Basic Math Foundations Build a strong foundation in basic mathematics with a focus on essential concepts and problem-solving skills.	Introduction to Reading Comprehension Enhance your reading skills with guided practice in understanding and interpreting texts.	Basic Science Concepts Learn fundamental scientific principles through engaging activities and interactive lessons.	Essential Writing Skills Develop your writing abilities with step-by-step instructions and practical exercises.
--	---	---	---

Fig 7: Courses curated for Slow Learners

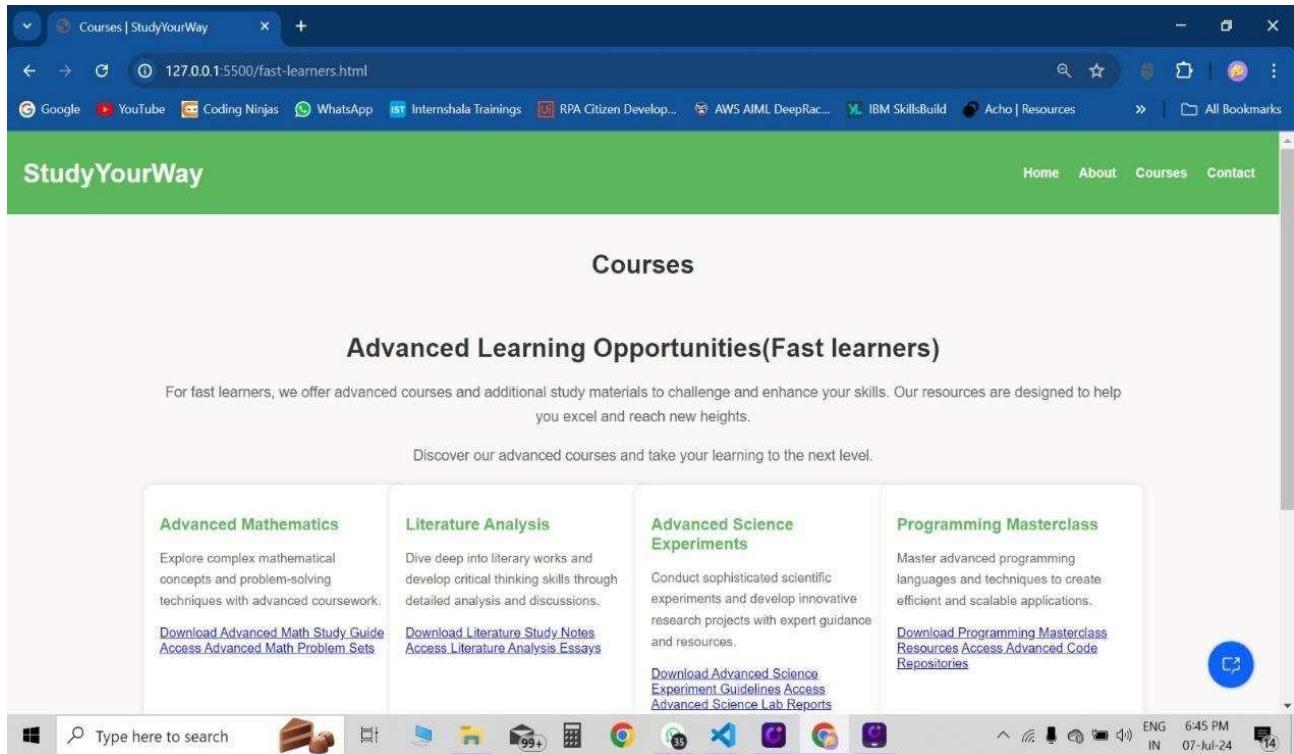


Fig 8: Courses curated for Fast Learners

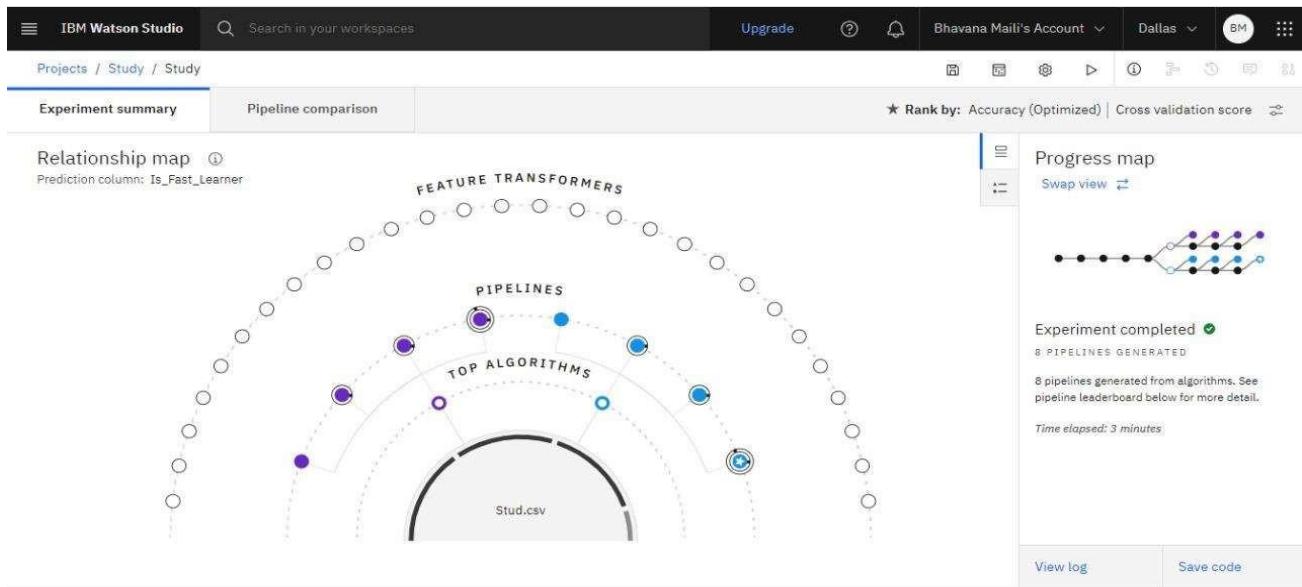


Fig 9: ML model built on IBM Watson Machine Learning