
CAPSTONE PROJECT

LEARNMATE – AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS

Presented By:
Shaik Jilani
Sri Vasavi Engineering College
AIML Department

OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

- Students often struggle to identify the right learning path that aligns with their interests and long-term goals. The vast number of online courses and lack of personalized guidance make it difficult to choose an optimal educational journey. Students need a solution that tailors course recommendations based on their unique preferences, current skill level, and goals, and that evolves as they progress.

PROPOSED SOLUTION

- The proposed system aims to address the challenge of guiding students to identify the right learning path that aligns with their interests and long-term goals. This involves leveraging data analytics and machine learning techniques to deliver personalized learning guidance. The solution will consist of the following components:
- **Data Collection:**
 - Gather data on students' backgrounds, current skills, areas of interest (e.g., Frontend Development, Cybersecurity, UI/UX Design), and long-term career goals.
 - Utilize real-time sources such as student interactions, quiz results, course feedback, and progression metrics to enhance personalization and adapt recommendations.
- **Data Preprocessing:**
 - Clean and preprocess collected data to handle missing information, outliers, and inconsistencies in self-reported skills or preferences.
 - Feature engineering to extract relevant aspects from the data that could impact learning recommendations—for example, learning style, pace, or past performance.
- **Machine Learning Algorithm:**
 - Use algorithms like collaborative filtering, sequence models , or reinforcement learning to recommend and continuously update personalized course roadmaps.
 - Use interests, skill gaps, past results, and industry trends to make better recommendations.
- **Deployment:**
 - Develop an app where students interact with LearnMate to get and track personalized learning paths.
 - Deploy the solution on a scalable and reliable platform, considering performance requirements, responsiveness, and accessibility.
- **Evaluation:**
 - Evaluate the system's effectiveness by tracking student satisfaction, learning results, path adherence, and goal achievement rates.
 - Fine-tune the model based on feedback and continuous monitoring of prediction accuracy.
 - Result: Personalized learning paths that adapt to student interests and goals.

SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the LearnMate personalized learning path recommendation system. Here's a suggested structure for this section:

- IBM Cloud Lite Services
- IBM Granite Foundation Model
- Watson Assistant (for conversational interface)
- Node.js or Python backend
- MongoDB or IBM Cloudant (for storing user data and progress)
- React.js (for front-end interface)

ALGORITHM & DEPLOYMENT

- In the Algorithm section, describe the machine learning algorithm chosen for recommending personalized learning paths:
- **Algorithm Selection:**
 - Use a recommendation system combining collaborative filtering and content-based filtering.
 - Natural Language Understanding (NLU) for intent recognition and personalized dialogue using IBM Watson & Granite.
- **Data Input:**
 - Student's interests, skill level (assessed via quiz/interaction), goals, and course metadata.
- **Training Process:**
 - Fine-tuning IBM Granite model on student interaction data and course content metadata.
- **Deployment:**
 - Hosted on IBM Cloud (Lite), backend API integrated with frontend and chatbot interface.
 - Dashboard for dynamic course roadmap and skill progress visualization.

RESULT

IBM watsonx

Upgrade ? 🔔 Shaik Jilani's Account Dallas \$3

Deployment spaces / Agentic_AI / Learn Mate - Agentic AI For Personalized Course Pathways /


Learn Mate - Agentic AI For Personalized Course Pathways ✔ Deployed Online

API reference Test **Preview**

New chat +

Learn Mate - Agentic AI For Personalized Course Pathways 03:08 PM

Welcome to Learn Mate - Agentic AI For Personalized Course Pathways
Guiding students to discover learning paths that match their interests and career goals.



Quick start samples

Can you guide me in selecting the best learning path for my goals? →

Can you recommend beginner courses for frontend development? →

Type something... ➤


Learn Mate - Agentic AI For Personalized Course Pathways ✔ Deployed Online


API reference

Test

Preview

[New chat](#) +

 You 03:09 PM
Hi

 Learn Mate - Agentic AI For Personalized Course Pathways 03:09 PM
I'm LearnMate, your Agentic AI learning coach. How can I assist you today? Are you looking to explore new interests, assess your current skill level, or create a personalized learning path? Perhaps you'd like to discuss topics like Frontend Development, Cybersecurity, or UI/UX Design? I'm here to help and provide guidance. What's on your mind?

► How did I get this answer?





Type something...



Learn Mate - Agentic AI For Personalized Course Pathways ✔ Deployed Online

[API reference](#) [Test](#) [Preview](#)

[New chat](#) +

-  You 03:22 PM
- Hi, I'm Jilani. I've recently completed my intermediate studies and I'm passionate about coding. My goal is to become a backend developer. Can you guide me with the best learning pathway to achieve this?
-  Learn Mate - Agentic AI For Personalized Course Pathways 03:22 PM
- Nice to meet you, Jilani! Congratulations on completing your intermediate studies! Becoming a backend developer is a great career goal, and I'd be happy to help you create a personalized learning pathway.
- To get started, can you tell me a bit more about your current coding skills and experience? For example, have you learned any programming languages, such as Python, Java, or JavaScript? Do you have any familiarity with databases, web development frameworks, or APIs?
- Also, what specific areas of backend development interest you the most? For instance, are you drawn to:
1. Server-side programming languages like Python, Ruby, or PHP?
 2. Frameworks like Django, Ruby on Rails, or Laravel?
 3. Database management systems like MySQL, MongoDB, or PostgreSQL?
 4. API design and development using RESTful APIs or GraphQL?
 5. Cloud computing platforms like AWS, Google Cloud, or Microsoft Azure?
- Sharing your thoughts and interests will help me provide a more tailored guidance and recommendations for your learning journey.
- Additionally, what is your preferred learning style? Do you like:
1. Online courses and tutorials?

Type something...



IBM watsonx

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API referenceTestPreview

New chat +

Let's chat, and I'll help you create a customized learning plan to achieve your goal of becoming a backend developer!

To find the best online resources for your learning pathway, I will search for "best online courses for backend development".

S

You 03:26 PM

Please provide a beginner-level learning pathway to help me start my journey toward becoming a backend developer

🗉

Learn Mate - Agentic AI For Personalized Course Pathways 03:26 PM

Here's a beginner-level learning pathway to help you get started on your journey to becoming a backend developer:

Phase 1: Fundamentals (1-3 months)

1. **Programming basics:** Start with the basics of programming using languages like Python, JavaScript, or Java. Online resources like Codecademy, FreeCodeCamp, or Coursera can help.

2. **Data structures and algorithms:** Understand the concepts of data structures (arrays, lists, stacks, queues) and algorithms (sorting, searching, graph traversal). Platforms like LeetCode, HackerRank, or GeeksforGeeks can provide practice problems.

3. **Introduction to web development:** Learn the basics of web development, including HTML, CSS, and JavaScript. Understand how the web works, including requests, responses, and APIs.

Phase 2: Backend Foundations (3-6 months)

1. **Server-side programming:** Choose a server-side programming language like Python (with Flask or Django), JavaScript (with Node.js and Express), or Ruby (with Ruby on Rails). Learn the basics of the language and its ecosystem.

2. **Database fundamentals:** Understand the basics of database management systems, including data modeling, schema design, and querying. Start with relational databases like MySQL or PostgreSQL, and then explore NoSQL databases like [MongoDB](#).

type something...

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edunet
foundation

CONCLUSION

- LearnMate bridges the gap between abundant online resources and personalized learning needs. By leveraging Agentic AI and IBM technologies, students receive guided pathways tailored to their individual goals, skill levels, and evolving interests.

FUTURE SCOPE

- Expand to include integration with major MOOC platforms (Coursera, edX, etc.)
- Enable peer-to-peer mentorship recommendations
- Incorporate voice-based interaction and mobile app
- Add certification tracking and AI-powered motivation nudges

REFERENCES

- IBM Granite Documentation
- IBM Cloud Lite Documentation
- Research papers on personalized recommendation systems
- User-centric design principles in EdTech

IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



Shaik Jilani

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



Issued on: Jul 23, 2025

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IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Shaik Jilani

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT)

Learning hours: 20 mins



THANK YOU