# CAPSTONE PROJECT

## AGENTIC AI FOR PERSONALIZED COURSE PATHWAYS

Presented By:

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edunet foundation

# 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

Example: Students often struggle to identify the right learning path that aligns with their interests and long-term goals due to the overwhelming number of online courses and a lack of personalized guidance. LearnMate aims to solve this by acting as an Agentic AI coach that interacts with students, understands their interests (like Frontend Development, Cybersecurity, UI/UX Design, etc.), assesses their current skill level, and dynamically builds a personalized course roadmap that adapts over time based on progress and preferences.

# PROPOSED SOLUTION

The proposed system aims to address the challenge students face in identifying the most suitable learning path aligned with their interests and long-term goals. This involves leveraging AI-driven personalization and adaptive learning techniques to create a dynamic, guided educational experience.

Data Collection:

- **Gather user profile data** including interests (e.g.: Frontend Development, Cybersecurity, UI/UX Design), learning goals and time commitment.
- **Utilize external data sources** such as skill demand from job portals, trending tech stacks and course ratings, to align learning paths with real-world needs.

Data Preprocessing:

- **Clean and normalize input data** to ensure consistency across diverse interest areas and user backgrounds.
- **Perform feature extraction** to identify key traits like prior knowledge, preferred learning styles and pacing.

Machine Learning Algorithm:

- **Implement a recommendation engine** such as collaborative filtering or deep learning models, to match students with personalized course sequences.
- **Integrate a reinforcement learning component** to dynamically adapt course recommendations based on real-time feedback and progress.

Deployment:

- **Develop an interactive AI coach interface** that guides users through skill assessment, roadmap visualization and course tracking.
- **Deploy the solution on scalable cloud infrastructure** ensuring low latency and seamless user experience across devices.

Evaluation:

- **Assess recommendation quality** using metrics such as course completion rate, user satisfaction scores and learning outcomes.
- **Continuously refine algorithms** through user feedback, engagement tracking and A/B testing to enhance personalization accuracy.

Result:

- A personalized, adaptive learning platform that helps students navigate their educational journey with confidence, minimizes decision fatigue and aligns learning outcomes with career aspirations.

# SYSTEM APPROACH

The "System Approach" section outlines the overall strategy and methodology for developing and implementing the LearnMate AI coaching platform using **IBM Cloud** services and tools.

- *System Requirements*
- **Hardware Requirements (Local Development/Testing):**

  Minimum: 8 GB RAM, Dual-Core CPU, 50 GB free space and recommended: 16+ GB RAM, Multi-core CPU/GPU, SSD for faster local testing
- **IBM Cloud Resources:**

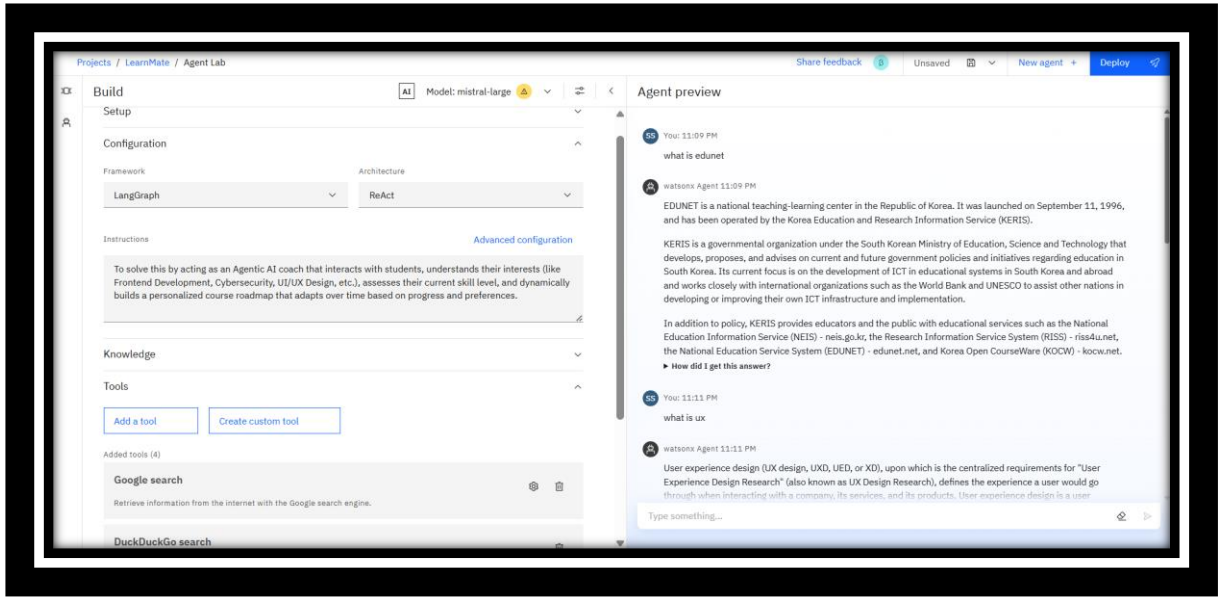
  IBM Watson Studio, IBM Cloud Object Storage, IBM Watson Machine Learning
- *Libraries Required to Build the Model*

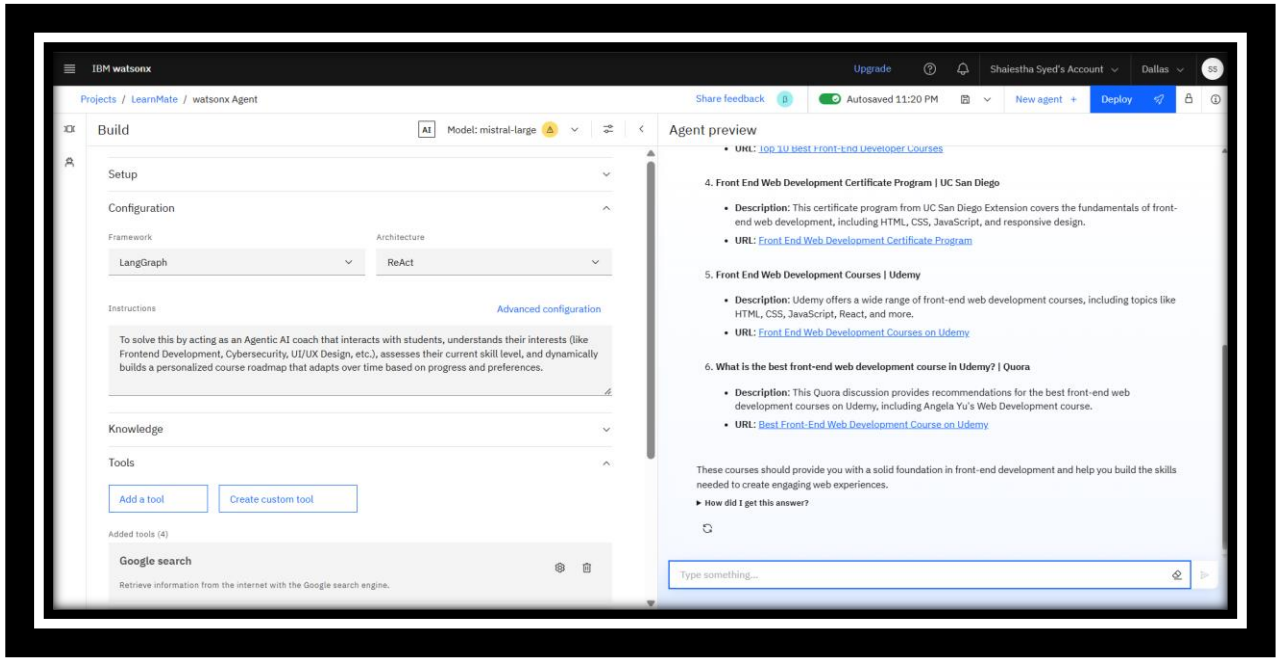
Data Handling & Preprocessing, Machine Learning & Personalization, Natural Language Understanding etc

# ALGORITHM & DEPLOYMENT

- In the Algorithm section, we describe the machine learning algorithm chosen for dynamically recommending personalized learning paths
- **Algorithm:** Uses **Collaborative Filtering + Reinforcement Learning** to recommend and adapt learning paths.
- **Platform:** Built and deployed on **IBM Watson Machine Learning**.
- **Data Input:** Learner interests, skill level, progress, feedback and market trends.
- **Training:** Done in **Watson Studio** with tuning and validation.
- **Prediction:** Real-time updates via Watson ML APIs; integrated with frontend using **IBM Cloud Foundry**

# RESULT


Projects / LearnMate / Agent Lab
Share feedback
Unsaved
New agent
Deploy
Build
Model: mistral-large
Agent preview
Setup
Configuration
Framework
LangGraph
Architecture
ReAct
Instructions
Advanced configuration
To solve this by acting as an Agentic AI coach that interacts with students, understands their interests (like Frontend Development, Cybersecurity, UI/UX Design, etc.), assesses their current skill level, and dynamically builds a personalized course roadmap that adapts over time based on progress and preferences.
Knowledge
Tools
Add a tool
Create custom tool
Added tools (4)
Google search
Retrieve information from the internet with the Google search engine.
DuckDuckGo search
You: 11:09 PM
what is edunet
watsonx Agent 11:09 PM
EDUNET is a national teaching-learning center in the Republic of Korea. It was launched on September 11, 1996, and has been operated by the Korea Education and Research Information Service (KERIS).
KERIS is a governmental organization under the South Korean Ministry of Education, Science and Technology that develops, proposes, and advises on current and future government policies and initiatives regarding education in South Korea. Its current focus is on the development of ICT in educational systems in South Korea and abroad and works closely with international organizations such as the World Bank and UNESCO to assist other nations in developing or improving their own ICT infrastructure and implementation.
In addition to policy, KERIS provides educators and the public with educational services such as the National Education Information Service (NEIS) - neis.go.kr, the Research Information Service System (RISS) - riss4u.net, the National Education Service System (EDUNET) - edunet.net, and Korea Open CourseWare (KOCW) - kocw.net.
How did I get this answer?
You: 11:11 PM
what is ux
watsonx Agent 11:11 PM
User experience design (UX design, UXD, UED, or XD), upon which is the centralized requirements for "User Experience Design Research" (also known as UX Design Research), defines the experience a user would go
Type something...


IBM watsonx
Upgrade
Shaiestha Syed's Account
Dallas
Projects / LearnMate / watsonx Agent
Share feedback
Autosaved 11:20 PM
New agent
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Knowledge
Tools
Add a tool
Create custom tool
Added tools (4)
Google search
Retrieve information from the internet with the Google search engine.
URL: Top 10 Best Front-End Developer Courses
4. Front End Web Development Certificate Program | UC San Diego
Description: This certificate program from UC San Diego Extension covers the fundamentals of front-end web development, including HTML, CSS, JavaScript, and responsive design.
URL: Front End Web Development Certificate Program
5. Front End Web Development Courses | Udemy
Description: Udemy offers a wide range of front-end web development courses, including topics like HTML, CSS, JavaScript, React, and more.
URL: Front End Web Development Courses on Udemy
6. What is the best front-end web development course in Udemy? | Quora
Description: This Quora discussion provides recommendations for the best front-end web development courses on Udemy, including Angela Yu's Web Development course.
URL: Best Front-End Web Development Course on Udemy
These courses should provide you with a solid foundation in front-end development and help you build the skills needed to create engaging web experiences.
How did I get this answer?
Type something...

# CONCLUSION

- **LearnMate provides a personalized, AI-driven learning experience by leveraging machine learning and IBM Cloud technologies. Through adaptive recommendations, real-time feedback, and scalable deployment, the platform empowers students to achieve their goals efficiently. With continuous improvement and data-driven insights, LearnMate stands as a smart solution for modern education.**

# FUTURE SCOPE

- **Integration with IBM Watson Assistant** for voice-based AI coaching.
- **Support for multiple languages** to reach global learners.
- **Gamification features** to boost engagement and retention.
- **Real-time job market analysis** to align learning paths with in-demand skills.
- **Enhanced analytics dashboards** using IBM Cognos for deeper learning insights.
- **Mobile app deployment** for on-the-go learning access.

# REFERENCES


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•Chen, T., & Guestrin, C. (2016). XGBoost: A Scalable Tree Boosting System. *KDD Conference*.
•Panigrahi, S., & Jena, S. K. (2020). Personalized Learning Path Recommendation Using Machine Learning
•. *Advances in Machine Learning and Computational Intelligence*.

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IBM

# IBM CERTIFICATIONS

IBM **SkillsBuild** Completion Certificate



This certificate is presented to

Shaiestha Syed

for the completion of

**Lab: Retrieval Augmented Generation with LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

**Completion date:** 25 Jul 2025 (GMT) **Learning hours:** 20 mins

# IBM CERTIFICATIONS

# THANK YOU

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