

CAPSTONE PROJECT

RESEARCH AGENT

Presented By:

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OUTLINE

- Problem Statement
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- Wow factor
- End users
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- Git-hub Link
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PROBLEM STATEMENT

Researchers and students face challenges in tracking and reviewing the ever-growing volume of academic papers and data.



Proposed Solution:

An AI Research Agent using NLP and RAG that searches, summarizes, and organizes academic content, recommends papers, and identifies research gaps using IBM Granite model.

TECHNOLOGY USED

- **IBM cloud lite services**

A free-tier offering of IBM Cloud that allows users to build and deploy lightweight applications with limited resources.

- **Natural Language Processing (NLP)**

A branch of AI that enables machines to understand, interpret, and respond to human language.

- **Retrieval Augmented Generation (RAG)**

A technique that enhances AI responses by retrieving relevant information from a knowledge base before generating an answer.

- **IBM Granite model**

A powerful foundation model from IBM trained on diverse data to perform a variety of language understanding and generation tasks.

- **Vector Indexing for RAG**

A method of storing and searching document embeddings efficiently to enable fast and relevant information retrieval in RAG systems.

IBM CLOUD SERVICES USED

- **IBM Cloud Watsonx AI Studio**

A collaborative environment in IBM Cloud for building, training, and deploying AI models using foundation models like Granite.

- **IBM Cloud Watsonx.AI runtime**

A managed runtime on IBM Cloud that hosts and executes foundation models with scalability and security.

- **IBM Cloud Agent Lab**

An interactive lab interface within Watsonx for developing, testing, and refining AI agents using Granite and custom logic.

- **IBM Granite foundation model**

IBM's large-scale, enterprise-grade language model designed for diverse generative AI tasks such as summarization, Q&A, and content generation.

- **IBM Cloud Object Storage**

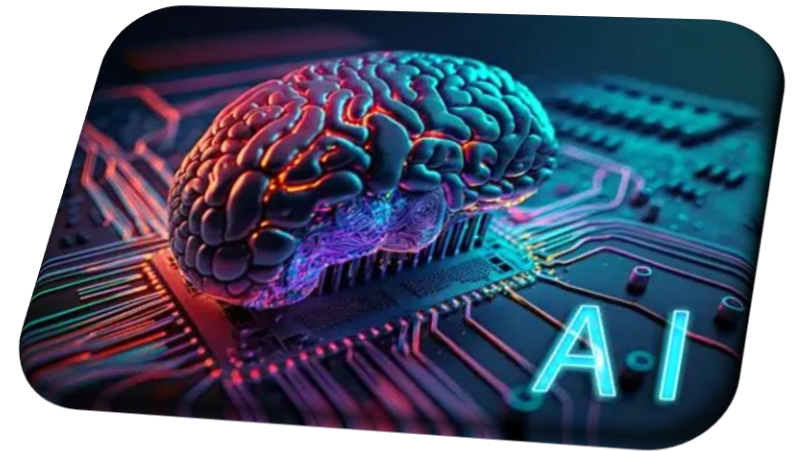
A scalable, durable cloud storage service for storing and accessing unstructured data like documents, vectors, and models.

WOW FACTORS

This AI-powered agent transforms how researchers interact with scholarly information. It significantly reduces the time spent on literature reviews, improves the quality of research insights by leveraging contextual understanding, and assists early-stage researchers in finding a clear research direction. By making large volumes of academic knowledge more accessible and actionable, it also encourages interdisciplinary collaboration and knowledge reuse across fields.

Unique features:

- Semantic search across research papers, journals, and datasets.
- Auto-summarization of selected papers.
- Citation and reference analysis to trace influence.
- Paper recommendations based on current queries.
- Collaboration mapping for co-authors or instructions.



END USERS

- **Academic Researchers**

Accelerates the discovery of relevant literature and supports hypothesis generation.

- **Research Institutions and Universities**

Enhances research quality and collaboration through intelligent automation.

- **Industry R&D Teams**

Speeds up innovation cycles by surfacing cutting-edge findings and trends.

- **Educators**

Aids in curating and summarizing academic content for effective teaching and course design.

RESULTS

Successfully deployed an interactive AI agent

Accepts user questions and returns research summaries

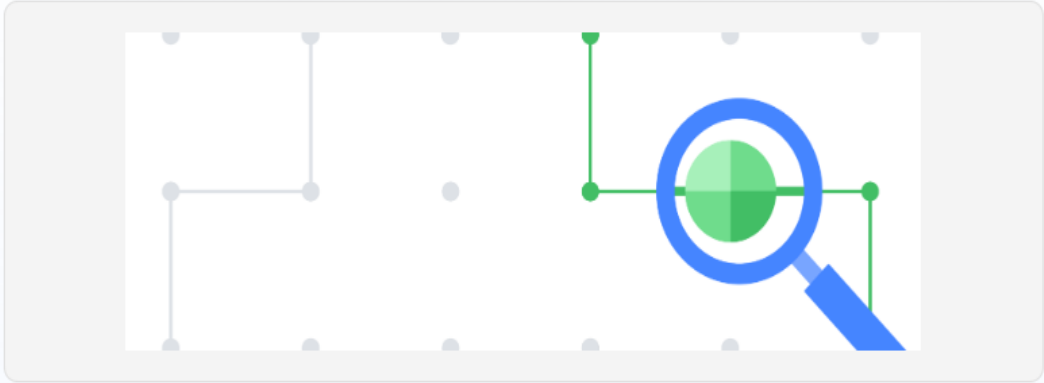
research_agent_ai ✓ Deployed Online

API reference test **Preview**

New chat +

research_agent_ai 10:02 PM

Welcome to research_agent_ai
An AI-powered research assistant



Quick start samples

Type something... ➤

RESULTS

Extracts answers from uploaded vector index

Integrated with IBM Granite model for reliable NLP generation

Performance tested in IBM Watsonx runtime

research_agent_ai

✓ Deployed Online

API reference

Test


Preview

New chat +

R

You 10:03 PM

Find related papers on deep learning for medical imaging.



research_agent_ai 10:03 PM

I have found several papers related to deep learning in medical imaging. Here are some abstracts and keywords from relevant research:

1. **Title:** Deep Learning in Medical Imaging: A Review

- **Abstract:** This paper reviews the application of deep learning techniques in various medical imaging modalities, including MRI, CT, and ultrasound. It discusses the potential of deep learning in improving diagnostic accuracy and automation of image analysis.
- **Keywords:** medical imaging, deep learning, MRI, CT, ultrasound, diagnostic accuracy, automation

Type something...

➤

RESULTS

This screenshot displays a live interaction with the Research Agent AI, deployed on IBM Watsonx.ai using the Granite foundation model. When asked “*What is the main role of a Research Agent AI in scientific work?*”, the agent responds intelligently, showcasing its core capabilities:

- **Information Retrieval** – Quickly finding relevant literature.
- **Data Analysis** – Identifying patterns and insights.
- **Hypothesis Generation** – Suggesting new research directions.

research_agent_ai ✓ Deployed Online

API reference Test **Preview**

New chat +

R

You 10:04 PM

What is the main role of a Research Agent AI in scientific work

raj vishwakarma (raj8679456150@gmail.com) is signed in

research_agent_ai

10:04 PM

Hi, I am watsonx.ai agent. How can I help you?

A Research Agent AI, like me, plays a crucial role in scientific work by facilitating and enhancing the research process. Here are some of the main roles:

1. **Information Retrieval:** Research Agent AI can quickly sift through vast amounts of data and literature to find relevant information, saving researchers significant time and effort.

2. **Data Analysis:** It can analyze complex datasets, identify patterns, and provide insights that might be missed by human researchers.

3. **Hypothesis Generation:** By identifying gaps in existing research and suggesting new connections between different areas of study, a Research Agent AI can help generate novel

Type something... ➤

edunet
foundation

RESULTS

Deployed AI Agent

IBM watsonx

Upgrade ? 🔔

Raj vishwakarma's Account ▾ Dallas ▾ RV ⋮

Deployment spaces / Nutrition_Agent / research_agent_ai /

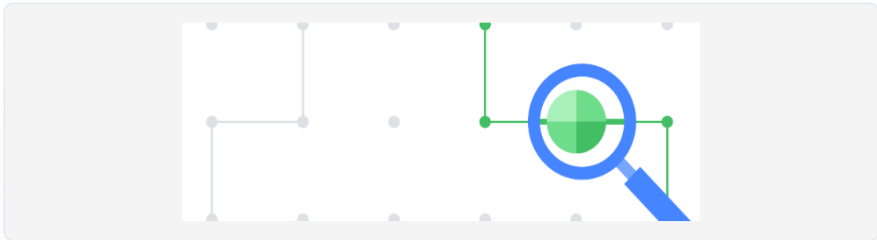
research_agent_ai ✔ Deployed Online

API reference Test **Preview**

New chat +

welcome to research_agent_ai

An AI-powered research assistant



Quick start samples

Find related papers on deep learning for medical imaging.

Generate a brief literature review on AI in education

Type something... ➤

CONCLUSION

- Streamlines literature review by quickly retrieving and summarizing relevant academic content.
- Automates citation and reference management, reducing manual effort.
- Boosts research productivity for students, researchers, and R&D professionals.
- Leverages IBM Granite for accurate, real-time understanding of complex queries.



FUTURE SCOPE

- Multilingual Research Support
- Voice-Activated Research Assistant
- Real-Time Collaboration Features
- Research Gap and Novel Topic Identification
- Integration with Publishing Platforms
- Novel Topic Identification
- Auto Drafting Research Papers

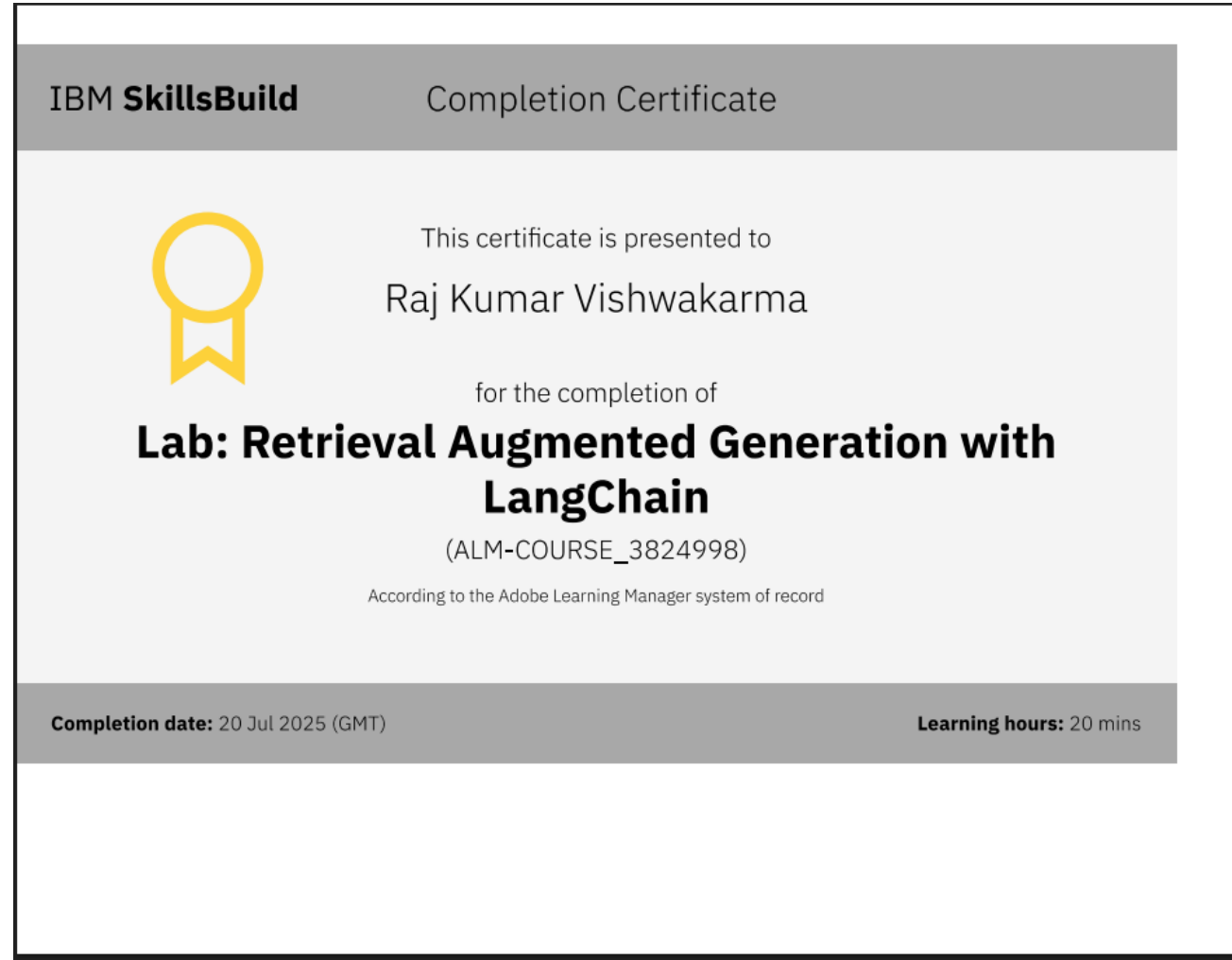


IBM CERTIFICATIONS

- Screenshot/ credly certificate(getting started with AI)



RAG LAB certificate



Git hub link : <https://https://github.com/rajvishwakarma90/Research-Agent--Ai>



THANK YOU