

IBM HACKATHON PROJECT

RESEARCH AGENT

ResearchMate

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OUTLINE

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PROBLEM STATEMENT

A Research Agent is an AI system designed to assist with academic and scientific research tasks. It can autonomously search for literature, summarize papers, and organize references. Using natural language processing, it understands research questions and retrieves relevant information. The agent can generate reports, suggest hypotheses, and even draft sections of research papers. It saves time by automating repetitive tasks like citation management and data extraction. Research Agents enhance efficiency, accuracy, and innovation in both academic and industrial R&D.

Technology - Use of IBM cloud lite services /IBM Granite is mandatory.

PROPOSED SOLUTION

To address the challenges faced in academic and industrial research workflows—such as information overload, time-consuming literature review, and manual citation management—we propose **ResearchMate**, an AI-powered research agent built on IBM's Watsonx platform.

Smart Literature Discovery & Summarization

Automatically search, retrieve, and generate concise summaries of relevant academic papers.

Automated Reference Management

Format and manage citations in standard formats like APA, MLA, and IEEE with minimal effort.

☐ **Conversational Research Assistant**

Use a Watson-powered chatbot to interactively explore topics, compare research papers, and answer domain-specific queries.

AI-Powered Report Generation

Compile research insights, summaries, and citations into structured, editable draft documents.

Scalable Cloud Infrastructure

Host the agent on IBM Cloud for secure, reliable, and scalable research support.

TECHNOLOGY USED

- ❑ **IBM Cloud Lite**

Free tier cloud platform hosting the agent's backend, APIs, and storage using Watson services.

- ❑ **IBM Watsonx Assistant & Foundation Models:** Context-aware conversations and advanced language understanding.

- ❑ **Natural Language Processing (NLP)**

Enables the agent to understand research queries, extract key terms, and interpret paper content

- ❑ **Retrieval-Augmented Generation (RAG)**

Combines document retrieval with AI-generated responses to provide accurate, context-rich answers.

- ❑ **IBM Granite Model**

A powerful foundation model used for summarization, comparison, and research content generation.

IBM CLOUD SERVICES USED

- ❑ **IBM Cloud Watsonx AI Studio**

A collaborative environment for building, training, and tuning AI models. Used to design the Research Agent workflows and fine-tune its response behavior.

- ❑ **IBM Cloud Watsonx AI Runtime**

Executes and manages AI models at scale, enabling real-time inference for user queries and document analysis.

- ❑ **IBM Cloud Agent Lab**

Provides a low-code interface to configure and deploy intelligent agents. Used to build and customize the ResearchMate conversational experience.

- ❑ **IBM Granite Foundation Model**

A large language model from IBM used for high-quality summarization, comparison, and generation tasks within the research domain.

WOW FACTORS

What sets this Research Agent apart is its ability to go beyond basic keyword search. It acts as an intelligent assistant that understands the intent behind research queries, presents insightful summaries, and streamlines the entire academic workflow—all in a conversational, user-friendly format.

- 🎯 Context-aware retrieval for highly relevant and focused results
- Smart summarization of academic papers using NLP and LLMs
- 📊 Side-by-side comparison of multiple sources for deeper insights
- 🔗 Always includes links to original papers (when available)
- 📄 Auto-generated citations in popular academic formats
- 💬 Conversational interface for natural, intuitive research interaction

END USERS

- ❑ **Students & Researchers:** Faster literature reviews.
- ❑ **Professors & Lecturers:** Preparing course materials or lectures.
- ❑ **Librarians & Academic Institutions:** Offering advanced search assistance.
- ❑ **Industry Professionals:** Staying current with technological trends.

RESULTS

[Projects](#) / [Research](#) / [Agent Lab](#)

[Share feedback](#)

Unsaved

[New agent](#) +

Deploy


Build >

Agent preview

ResearchMate 01:37 AM

Welcome to ResearchMate

I'm ResearchMate — your AI assistant for papers, summaries, comparisons, and citations.



Sample questions



Find relevant research papers based on my topic →


Summarize the uploaded research paper →

Type something... →


RESULTS

[Projects](#) / [Research](#) / Agent Lab

Share feedback 3 Unsaved  [New agent](#) + [Deploy](#) 

 Build >

Agent preview





Sample questions

Find relevant research papers based on my topic →

Summarize the uploaded research paper →

Organize references in a specific citation format →

Compare research papers →

Type something...  

RESULTS

Projects / Research / Agent Lab

Share feedback

β

Unsaved



New agent +

Deploy



Build >

Agent preview



You: 01:39 AM

Find relevant research papers based on my topic



ResearchMate 01:39 AM

Please enter the specific research topic or question you'd like me to find peer-reviewed papers for.

► How did I get this answer?



You: 01:39 AM

Forest Fire Detection



ResearchMate 01:39 AM

Sure, here are some relevant research papers on forest fire detection:

1. "Early Forest Fire Detection Using Sensors" by Bosch Global - This article discusses the use of small sensors to prevent forest fires and protect people, animals, and the environment.
2. "Dryad Networks: Ultra Early Wildfire Detection" by Dryad Networks - This article presents a system and methodology for detecting forest fires at the initial stage using a wireless sensor network.
3. "Forest fire detection system using wireless sensor networks and machine learning algorithms" by Nature - This paper proposes a system and methodology for detecting forest fires at the initial stage using a wireless sensor network and machine learning algorithms.

Type something...



RESULTS

Projects / Research / ResearchMate

Share feedback

β

Autosaved 1:42 AM



New agent +

Deploy



Build >

Agent preview



You: 01:41 AM

Compare research papers



ResearchMate 01:41 AM

I'm happy to help you compare research papers. However, I need you to provide me with the papers or their links. Please upload or paste two (or more) research papers or their links so I can compare them.

Additionally, could you please let me know what specific aspects of the papers you would like me to compare? Would you like me to focus on the research objectives, methodologies, key findings, or something else?

► How did I get this answer?




You: 01:42 AM

Attention Is All You Need <https://arxiv.org/abs/1706.03762>

BERT: Pre-training of Deep Bidirectional Transformers for Language Understanding <https://arxiv.org/abs/1810.04805>

RESULTS

 You: 01:45 AM

Smith, John; Doe, Jane. "A Novel Approach to Quantum Computing." Journal of Theoretical Physics, vol. 45, no. 3, 2021, pp. 123–138.

Zhang, Wei; Kumar, Anil; Patel, Ravi. "Deep Learning for Medical Image Analysis." IEEE Transactions on Medical Imaging, 2020.

García, María; Thompson, Robert L. "Renewable Energy Integration in Smart Grids: Challenges and Solutions." Renewable and Sustainable Energy Reviews, vol. 112, 2019.

Nguyen, Linh; O'Connor, Seán; Lee, Sun. "Natural Language Processing for Legal Document Review." Proceedings of the 58th Annual Meeting of the ACL, 2020, pp. 402–412.

Brown, Emily R. "Assessing Climate Change Impacts on Coastal Ecosystems." PhD diss., University of California, Berkeley, 2018. Organise into Chicago Citation style

 ResearchMate 01:45 AM

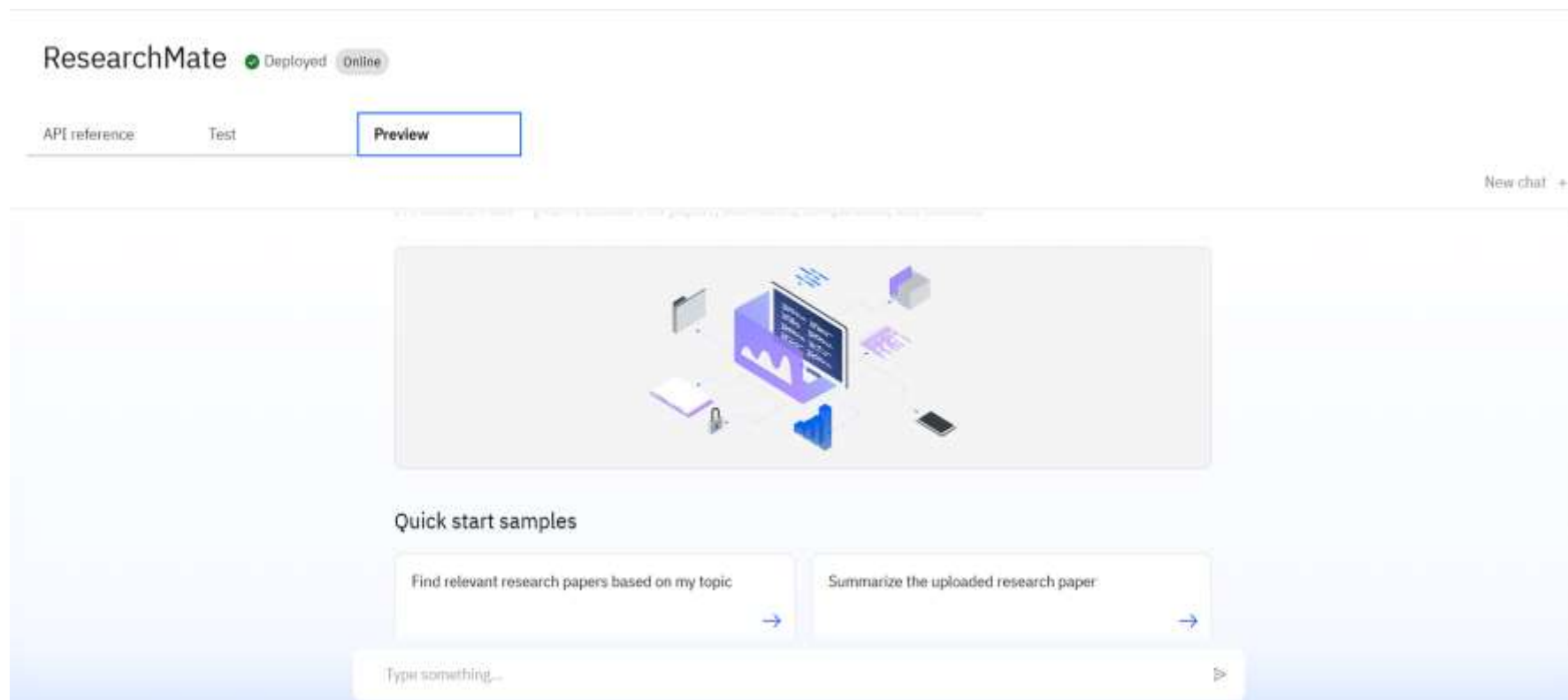
Here are the references organized in Chicago Citation style:

Smith, John, and Jane Doe. "A Novel Approach to Quantum Computing." Journal of Theoretical Physics 45, no. 3 (2021): 123-138.

Zhang, Wei, Anil Kumar, and Ravi Patel. "Deep Learning for Medical Image Analysis." IEEE Transactions on Medical

RESULTS

Deployed AI Agent



CONCLUSION

- ✓ ResearchMate bridges the gap between complex academic content and user-friendly, actionable insights.
- ✓ Enhances productivity, accuracy, and confidence in literature research.
- ✓ Ready for further development and integration with academic platforms.

GITHUB LINK

<https://github.com/Yugan-Dhar/IBM-SkillsBuild>

FUTURE SCOPE

- ❑ Add support for multiple languages and cross-lingual search.
- ❑ Integrate advanced analytics (e.g., citation networks, topic trends).
- ❑ Enable user profiles for personalized recommendations.
- ❑ Automate literature review report generation.
- ❑ Connect to institutional repositories for private collections.

IBM CERTIFICATIONS

In recognition of the commitment to achieve
professional excellence



Yugan Dhar

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



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IBM CERTIFICATIONS

IBM SkillsBuild

Completion Certificate



This certificate is presented to

Yugan Dhar

for the completion of

**Lab: Retrieval Augmented Generation with
LangChain**

(ALM-COURSE_3824998)

According to the Adobe Learning Manager system of record

Completion date: 17 Jul 2025 (GMT)

Learning hours: 20 mins

THANK YOU

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