
CAPSTONE PROJECT

RESEARCH AGENT

Presented By:

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Computer Science and Engineering

OUTLINE

- Problem Statement
- Technology used
- IBM Cloud Services Used
- Wow factors
- End users
- Results
- Conclusion
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- IBM Certifications

PROBLEM STATEMENT

Researchers often face challenges in managing vast academic literature, generating hypotheses, and organizing references efficiently. There is a need for an intelligent agent that can automate repetitive research tasks like summarization, citation management, and data extraction

Proposed Solution:

CiteMate, an AI-powered research agent using **IBM Cloud Lite** and **Granite models**, will automate literature summarization, hypotheses generation, and citation management — helping researchers save time and focus on innovation.

TECHNOLOGY USED

IBM Cloud lite services

IBM Cloud Object Storage

IBM Granite model

Natural Language Processing (NLP)

IBM CLOUD SERVICES USED

- IBM Watsonx
- IBM Watsonx.ai
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model
- IBM Cloud Object Storage(COS)

WOW FACTORS

This agent can **autonomously search** and **summarize thousands of research papers** in seconds, saving researchers days of manual work.

Unique features:

- Instant literature summarization.
- Automated report generation.
- Smart citation management.
- Key data extraction.
- Hypothesis suggestion engine.
- Interactive data visualization.

END USERS

- Academic Researchers & Scientists
- Graduate and PhD students
- Corporate R&D Teams
- Research Institutions and Universities
- Data analysts working with scientific data
- Educational platforms and libraries

RESULTS

Upgrade

?

🔔

Ankita Jaiswal's Account

Sydney

AJ

⋮

Share feedback β Unsaved 📄 New agent + Deploy 🔗

Agent preview

AJ You: 01:26 AM

Hi CiteMate! I'm starting research on AI in cancer detection. Can you help me?

Cite_Mate 01:26 AM

Here are some recent research findings and developments in the field of AI in cancer detection:

1. AI can be trained to scan imaging like MRIs to identify and flag potential tumor-like structures in cancer research.
2. A new AI tool can diagnose cancer, guide treatment, and predict patient survival.
3. AI imaging algorithms can improve breast cancer detection on mammography and help in early cancer diagnosis.
4. AI tools are analyzing images and tissue samples to detect cancer sooner and more precisely.
5. AI has become a viable technique for cancer diagnosis by using machine learning algorithms to examine large volumes of data for cancer detection.
6. The combination of AI and multi-omics data is advancing precision medicine in cancer.
7. AI could help improve early detection of breast cancers between screenings.
8. AI may be able to spot cancer in a mammogram or other breast imaging that even a well-trained radiologist might miss.
9. Google has pioneered using AI to identify tiny clusters of cancer cells that have spread to the lymph nodes.

These findings and developments highlight the potential of AI in improving cancer detection and treatment. However, it's essential to note that AI should be used in conjunction with human

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Upgrade

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Agent preview

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9. Google has pioneered using AI to identify tiny clusters of cancer cells that have spread to the lymph nodes.

These findings and developments highlight the potential of AI in improving cancer detection and treatment. However, it's essential to note that AI should be used in conjunction with human expertise and judgment to ensure accurate and effective diagnosis and treatment.

► How did I get this answer?

AJ You: 01:27 AM

Can you suggest a hypothesis for a follow-up study?

Cite_Mate 01:27 AM

Based on the search results, a potential hypothesis for a follow-up study could be:

"Can the use of AI in cancer detection improve the accuracy of radiologists' diagnoses and reduce the number of false negatives, leading to better patient outcomes and earlier detection of cancer?"

This hypothesis could be explored through a study that compares the performance of radiologists using AI-assisted diagnosis with those using traditional methods, and examines the impact of AI on cancer detection rates, false negative rates, and patient outcomes.

► How did I get this answer?

🔄


🔍

🗨️


RESULTS

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

Agent preview

 You: 01:25 AM

Heyy! can you summarize the uploaded document for me?



 Cite_Mate 01:25 AM

The uploaded document appears to be a proposal for a blockchain-based voting system, specifically designed for the Smart India Hackathon 2024. The system, called "VoteChain," aims to provide a secure, transparent, and tamper-proof voting platform that leverages the principles of decentralized and distributed ledger technology.

The proposal highlights the challenges associated with traditional voting methods, such as voter fraud, vote manipulation, and lack of transparency, and how the proposed system addresses these issues. The key features of the system include:

1. Security and integrity: Blockchain ensures each vote is securely recorded as an immutable transaction, preventing any unauthorized alterations.
2. Transparency: Blockchain's decentralized nature enables real-time transparency, allowing all stakeholders to verify election integrity, thereby enhancing trust in the results.
3. Accessibility: The system's remote access boosts voter turnout and inclusivity by allowing participation from any location.
4. Cost-reduction: Blockchain-based voting cuts costs by removing the need for physical infrastructure and EVM.

The technical approach involves the use of Ethereum as the blockchain platform, Solidity for writing smart contracts, JavaScript for developing the front-end interface, and HTML & CSS for the development of the front-end. The system also utilizes HardHat for testing and deploying smart contracts, React.js for developing the user interface, Node.js for building the backend API, and

RESULTS

Deployed AI Agent

The screenshot displays the IBM watsonx Agent web interface. At the top, a dark navigation bar includes the 'IBM watsonx' logo, an 'Upgrade' button, and user account information for 'Ankita Jaiswal'. Below this, a breadcrumb trail shows the path: 'Deployment spaces / CiteMate / watsonx Agent /'. The main header for the 'watsonx Agent' section indicates it is 'Deployed' and 'Online'. Three tabs are visible: 'API reference', 'Test', and 'Preview', with the 'Preview' tab currently selected. The chat window shows a conversation starting with the agent's greeting: 'Hi, I am watsonx.ai agent. How can I help you?'. The user responds: 'Hi! I'm starting research on AI in cancer detection. Can you help me?'. The agent then provides a helpful response, stating it's happy to assist with research on AI in cancer detection and offers a list of five topics to explore, such as the current state of AI in cancer detection and specific AI techniques used.

IBM watsonx Upgrade ? Ankita Jaiswal's Account Sydney AJ

Deployment spaces / CiteMate / watsonx Agent /

watsonx Agent Deployed Online

API reference Test **Preview**

New chat +

watsonx Agent 02:08 AM
Hi, I am watsonx.ai agent. How can I help you?

You 02:08 AM
Hi! I'm starting research on AI in cancer detection. Can you help me?

watsonx Agent 02:08 AM
What a great topic! I'd be happy to help you with your research on AI in cancer detection.
To get started, can you please provide more context or specifics about what you're looking for? Are you looking for:

1. An overview of the current state of AI in cancer detection?
2. Information on specific types of cancers that AI is being used to detect?
3. Details on the different AI techniques being used, such as machine learning or deep learning?
4. Examples of successful AI-powered cancer detection systems?
5. Something else?

Type something...

RESULTS

The screenshot displays the IBM watsonx web interface. At the top, a dark navigation bar includes the 'IBM watsonx' logo, an 'Upgrade' button, and user account information for 'Ankita Jaiswal's Account' in 'Sydney'. Below this, a breadcrumb trail shows 'Deployment spaces / CiteMate / watsonx Agent'. The main content area features the 'watsonx Agent' title with 'Deployed' and 'Online' status indicators. Three tabs are visible: 'API reference', 'Test', and 'Preview', with 'Preview' being the active tab. On the right side of the chat area, there is a 'New chat +' button. The chat history shows a user asking for a hypothesis at 02:08 AM, followed by a detailed response from the watsonx Agent. The response includes a specific hypothesis about AI-powered radiology tools and a general statement about the value of AI in cancer detection. A third message from the user at 02:09 AM asks for more detail, and a text input field is visible at the bottom.

IBM watsonx Upgrade ? Ankita Jaiswal's Account Sydney AJ

Deployment spaces / CiteMate / watsonx Agent

watsonx Agent ✓ Deployed Online

API reference Test **Preview**

New chat +

A You 02:08 AM
Can you suggest a hypothesis for a follow up study?

watsonx Agent 02:08 AM
Based on the search results, here's a potential hypothesis for a follow-up study:

"Can the integration of AI-powered radiology tools with human radiologists improve the detection of lung cancer in chest radiographs, particularly in cases where the AI system has previously indicated a high risk of cancer, and if so, what are the key factors that contribute to this improvement?"

This hypothesis builds on the idea that AI can be a useful tool in cancer detection, but also acknowledges the potential limitations and biases of AI systems. By exploring the intersection of human radiologists and AI-powered tools, this study could provide valuable insights into how to optimize cancer detection and improve patient outcomes.

A You 02:09 AM
Explain in detail

Type something...

RESULTS

IBM watsonx

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Deployment spaces / CiteMate / watsonx Agent /

watsonx Agent Deployed Online

API reference

Test

Preview

Public endpoint

https://au-syd.ml.cloud.ibm.com/ml/v4/deployments/5e3c4f0b-8dd5-4897-bdba-2d7cac81cd69/ai_service?ver=

https://au-syd.ml.cloud.ibm.com/ml/v4/deployments/5e3c4f0b-8dd5-4897-bdba-2d7cac81cd69/ai_service_st=

[Learn more](#) about the 2021-05-01 version query parameter

Code snippets

cURL

Java

JavaScript

Python

Scala

```
import requests

# NOTE: you must manually set API_KEY below using information retrieved from your IBM Cloud account (https://au-syd.dai.cloud.ibm.com/docs/c
API_KEY = "<your API key>"
token_response = requests.post('https://iam.cloud.ibm.com/identity/token', data={"apikey": API_KEY, "grant_type": 'urn:ibm:params:oauth:grant
mltoken = token_response.json()["access_token"]

header = {'Content-Type': 'application/json', 'Authorization': 'Bearer ' + mltoken}

# NOTE: manually define and pass the array(s) of values to be scored in the next line
payload_scoring = {"messages":[{"content":"","role":""}]}

response_scoring = requests.post('https://au-syd.ml.cloud.ibm.com/ml/v4/deployments/5e3c4f0b-8dd5-4897-bdba-2d7cac81cd69/ai_service_stream?v
headers={'Authorization': 'Bearer ' + mltoken})
```

Show more

About this deployment

Name

watsonx Agent

Description

Change this description to reflect your particular agent

Deployment Details

Deployment ID: 5e3c4f0b-8dd5-48...

Serving name: No serving name.

Software specification: runtime-24.1-py3.11

Hardware specification: Extra extra small: 1 CPU and 2 GB RAM

Copies: 1

Tags

wx-agent

Associated asset

watsonx Agent

51e45ac2-0afb-43b8-ba95-a4be7db406c2

Last modified

1 minute ago

CONCLUSION

The Research Agent leverages cutting-edge AI and natural language processing to revolutionize the academic research process. By automating literature search, summarization, citation management, and report generation, it significantly reduces time and effort for researchers. This intelligent assistant not only accelerates discovery but also enhances the quality and efficiency of scientific work, empowering researchers to focus on innovation and impactful insights.

Git hub link : https://github.com/ankitaaa086/Cite_Mate

FUTURE SCOPE

- Extended database integration
- Deeper semantic analysis
- Real-time collaboration tools
- Multilingual research support
- Advanced data visualization
- Automated experiment design
- Personalized recommendations engine

IBM CERTIFICATIONS



IBM CERTIFICATIONS

IBM **SkillsBuild**

Completion Certificate



This certificate is presented to

Ankita Jaiswal

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

IBM CERTIFICATIONS





THANK YOU