
CAPSTONE PROJECT

RESEARCH AGENT

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OUTLINE

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PROBLEM STATEMENT

A **Research Agent** is an AI-powered assistant designed to streamline academic and scientific research. It uses **Natural Language Processing (NLP)** to understand research queries, search and summarize relevant literature, and organize references efficiently. This agent can also assist in drafting research content, generating hypotheses, and managing citations—saving significant time and effort. By automating repetitive research tasks, it enhances productivity and fosters innovation in R&D.

Technology Used: Integration of **IBM Cloud Lite services** and **IBM Granite AI models** is mandatory for building the Research Agent.

TECHNOLOGY USED

IBM cloud lite services

Natural Language Processing (NLP)

Retrieval Augmented Generation (RAG)

IBM Granite model

IBM CLOUD SERVICES USED

- IBM Cloud Watsonx AI Studio
- IBM Cloud Watsonx AI runtime
- IBM Cloud Agent Lab
- IBM Granite foundation model

WOW FACTORS

- **Semantic Search:** Finds relevant academic content from papers and datasets.
- **Smart Summarization:** Simplifies complex research into digestible insights.
- **Citation Mapping:** Shows relationships between cited works and academic influence.
- **Topic Recommendations:** Suggests related papers and authors based on current research interests.
- **Keyword Trends:** Tracks how research terms evolve over time.
- **Collaboration Discovery:** Identifies potential research partners and institutions

END USERS

- Academic Researchers
- Research Institutions and Universities
- Industry R&D Teams
- Educators

RESULTS

agent | IBM watsonx - [InPrivate]

83-5bf7-4703-8d30-78e25f227879&context=wx

Upgrade ? ? InPrivate NK


Share feedback β Autosaved 2:18 AM New agent + Deploy

Agent preview

research_agent 02:30 AM

Welcome to research_agent

A Research Agent is an AI-powered assistant designed to streamline academic and scientific research.



Type something...

ENG IN 02:30 04-08-2025

RESULTS

The screenshot displays the IBM Watsonx InPrivate web interface. The browser address bar shows a URL with a context parameter. The top navigation bar includes an 'Upgrade' button, a help icon, a notification bell, and a user profile for 'Nirbhay Kumar's Account' located in 'Dallas'. A secondary bar shows 're feedback', a beta flag, an 'Autosaved 2:32 AM' status, and buttons for 'New agent +' and 'Deploy'. The main content area is titled 'Agent preview' and contains a chat history. The chat starts with a user message at 02:32 AM asking for research ideas. The 'research_agent' responds at the same time with a list of five topics. Below the list is a link to see how the answer was generated. At the bottom, there is a text input field with the placeholder 'Type something...' and a send button. The Windows taskbar at the very bottom shows various application icons and the system clock set to 02:32 on 04-08-2025.

nt | IBM watsonx - [InPrivate]

3-5bf7-4703-8d30-78e25f227879&context=wx

Upgrade ? Bell Nirbhay Kumar's Account Dallas NK

re feedback β Autosaved 2:32 AM New agent + Deploy

Agent preview

NK You: 02:32 AM
suggest some researches idea

research_agent 02:32 AM

1. "The Impact of Artificial Intelligence on Mental Health Diagnosis and Treatment"
2. "Exploring the Role of Blockchain in Secure Data Sharing for Research Purposes"
3. "Investigating the Effects of Social Media Usage on Adolescent Cognitive Development"
4. "Analyzing the Efficacy of Telemedicine in Rural Areas: Challenges and Opportunities"
5. "Understanding Consumer Behavior Changes Due to COVID-19 Pandemic: An Empirical Study"

► How did I get this answer?

↻

Type something...

ENG IN 02:32 04-08-2025

RESULTS

The screenshot displays the IBM watsonx InPrivate web interface. At the top, the browser address bar shows the URL: `33-5bf7-4703-8d30-78e25f227879&context=wx`. The interface includes a top navigation bar with options like 'Upgrade', 'Nirbhay Kumar's Account', 'Dallas', and a 'Deploy' button. Below this, a 'Share feedback' link and an 'Autosaved 2:34 AM' status are visible. The main section is titled 'Agent preview' and shows a chat conversation. The user, 'NK', has asked for help writing a research paper on deep learning. The agent, 'research_agent', responds with a list of steps to follow. A code block is shown, containing a JSON query for Google Search. The chat interface also includes a text input field at the bottom with the placeholder 'Type something...'. The bottom of the screen shows a Windows taskbar with various application icons and a system tray with the date '04-08-2025' and time '02:34'.

Agent | IBM watsonx - [InPrivate]

33-5bf7-4703-8d30-78e25f227879&context=wx

Upgrade ? ? Nirbhay Kumar's Account Dallas NK

Share feedback Autosaved 2:34 AM New agent Deploy

< Agent preview

NK You: 02:33 AM
help me write research paper on deep learning

research_agent 02:33 AM
To write a research paper on deep learning, follow these steps:

- 1. Define Your Research Topic Clearly:** Start with a clear and focused research question or keywords related to your topic in the field of deep learning. For example, "Exploring Convolutional Neural Networks (CNNs) for Image Recognition."
- 2. Search for Literature:** Use the literature search feature to find relevant papers, articles, and reports about CNNs in image recognition using databases like IEEE Xplore Digital Library or Google Scholar. You can also use IBM Watson's knowledge studio combined with its natural language processing capabilities powered by IBM Granite models to gather information efficiently from various sources across the web through an API call if available within your setup environment.

Example query via Google Search function:

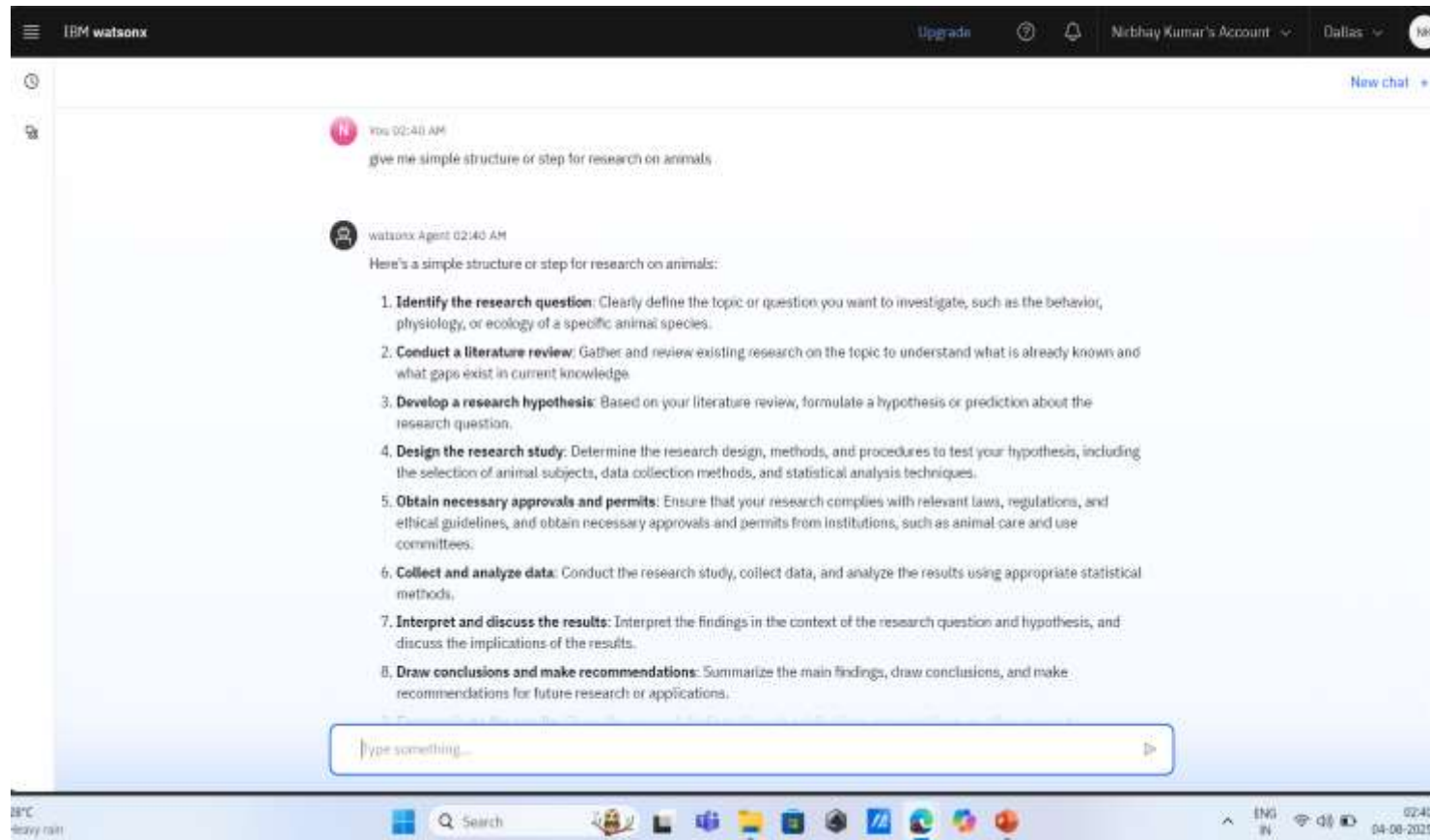
```
{
  "q": "deep learning convolutional neural networks image recognition"
}
```
- 3. Summarize Content:** Select any retrieved paper focusing on CNNs for image recognition; generate concise summaries highlighting objectives, methods used (e.g., data augmentation techniques), and findings achieved by different authors in this domain using AI tools capable of text summarization based on NLP technologies such as those provided by IBM Watson Discovery service integrated into your workflow if applicable here due to access permissions you have set up earlier during configuration stages involving IBM Cloud Lite services & APIs including Granite model usage where necessary per requirements outlined initially above).
- 4. Organize References:** Add selected papers systematically into a reference manager tool compatible with citation styles preferred (APA/MLA/Chicago etc.) ensuring proper attribution throughout draft writing phases ahead while maintaining organized records effortlessly managed digitally without manual intervention prone errors often encountered traditionally when handling physical copies manually stored physically over time accumulating dust bunnies! 🐰

Note: If no direct integration exists between chosen refmgr software & current platform being utilized herein consider exporting citations directly post completion stage adhering strictly prescribed formats stipulated previously mentioned standards beforehand meticulously applying them consistently thereafter avoiding

Type something...

RESULTS

Deployed AI Agent



CONCLUSION

- The Research Agent simplifies the research process by intelligently guiding users from question formulation to result communication.
- It reduces effort and improves precision by automating tasks like literature summarization, reference management, and paper drafting.
- Research Agents empower researchers and institutions to innovate faster and collaborate more effectively in both academic and industrial domains.

FUTURE SCOPE

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

IBM CERTIFICATIONS

In recognition of the commitment to achieve professional excellence



NIRBHAY KUMAR

Has successfully satisfied the requirements for:

Getting Started with Artificial Intelligence



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Completion Certificate



This certificate is presented to

Nirbhay Kumar

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

Git hub lik : <https://github.com/nirbhayb10/Research-agent.git>

GITHUB LINK

- Make sure that there should be readme file



THANK YOU