CAPSTONE PROJECT

RESEARCH AGENT

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OUTLINE

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- - Proposed Solution

- - System Development Approach (Technology Used)

- - Algorithm & Deployment

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PROBLEM STATEMENT

Academic research is time-consuming and complex, involving tasks like searching for literature, summarizing papers, managing references, and generating hypotheses.

Manual handling of these tasks leads to inefficiencies and delays, especially for students and researchers lacking resources or expertise.

There is a need for an AI-based solution that can assist in performing these research-related tasks accurately and efficiently.

PROPOSED SOLUTION

- The proposed system is a Research Agent — an AI-powered assistant built using IBM Watsonx and Granite models.

- It performs the following tasks:

- ✔ Summarizes academic papers

- ✔ Answers domain-specific research questions

- ✔ Suggests hypotheses based on a topic

- ✔ Organizes references and citations

- The agent is hosted entirely on IBM Cloud using Lite-tier services.

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SYSTEM APPROACH

- Platform: IBM Cloud (Lite Tier)

- Backend: IBM Watsonx.ai

- Foundation Model: Granite-13b-chat

- Hosting: IBM Code Engine

- File Handling: IBM Cloud Object Storage

- Programming Language: Python (Flask or FastAPI)
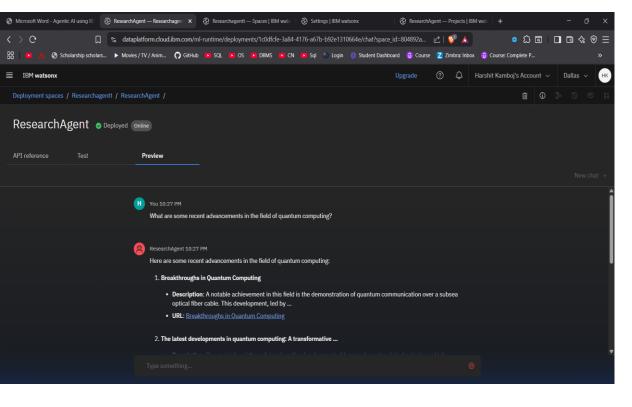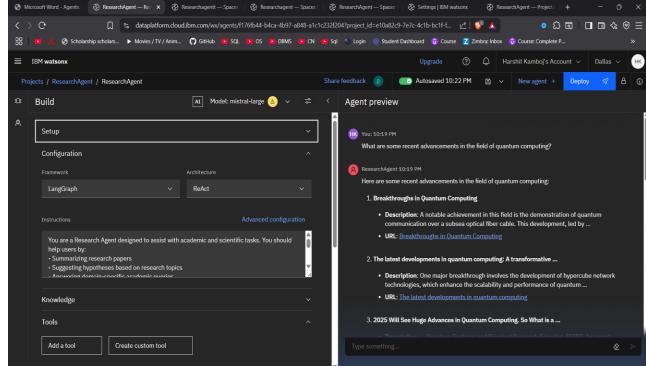
- SDKs/APIs: IBM GenAI SDK, COS SDK

ALGORITHM & DEPLOYMENT

- Model Used: IBM Granite (13b-chat)

- Prompt Engineering Approach:

- - Extract text from PDF or input query

- - Send to Granite LLM for summarization, question answering, or hypothesis generation

- - Format response into readable academic structure

- Deployment:

- - Agent logic deployed via IBM Code Engine

- - AI prompts configured in Watsonx.ai Prompt Lab

- - Storage and input handling done through Object Storage

RESULT

CONCLUSION

- The Research Agent successfully demonstrates how AI can streamline academic tasks like summarization, citation, and hypothesis suggestion.

- By leveraging IBM's Granite LLM and cloud services, the system provides fast, accurate, and scalable research assistance to students and researchers.

- It reduces manual effort and promotes efficient academic exploration.

FUTURE SCOPE

- - Add document upload and PDF parsing from frontend

- - Integrate voice-based question answering

- - Support for multilingual research papers

- - Enhanced role-based access (Student / Researcher / Admin)

- - Integration with Zotero, Mendeley, and citation databases

- - Extend to mobile/web app for broader accessibility

REFERENCES

- - IBM Watsonx.ai Documentation

- - IBM Granite Foundation Models

- - arXiv, IEEE, and CrossRef APIs

- - OpenAI Prompt Engineering Guidelines

- - Research papers on academic AI assistants

- (Include actual URLs or DOIs if required)

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