CAPSTONE PROJECT

RESEARCH AGENT

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OUTLINE

- **Problem Statement** (Should not include solution)
- **Proposed System/Solution**
- **System Development Approach** (Technology Used)
- **Algorithm & Deployment**
- **Result (Output Image)**
- **Conclusion**
- **Future Scope**
- **References**

PROBLEM STATEMENT

Researchers and students often spend significant time on repetitive and manual tasks such as literature review, citation management, and data extraction, which slows down the research process and limits productivity. There is a need for an intelligent, automated system that can assist in understanding research queries, retrieving relevant literature, summarizing key insights, and organizing references.

The goal is to develop a Research Agent that leverages Natural Language Processing (NLP) to automate these tasks, thereby enhancing efficiency, accuracy, and innovation in academic and industrial research workflows.

PROPOSED SOLUTION

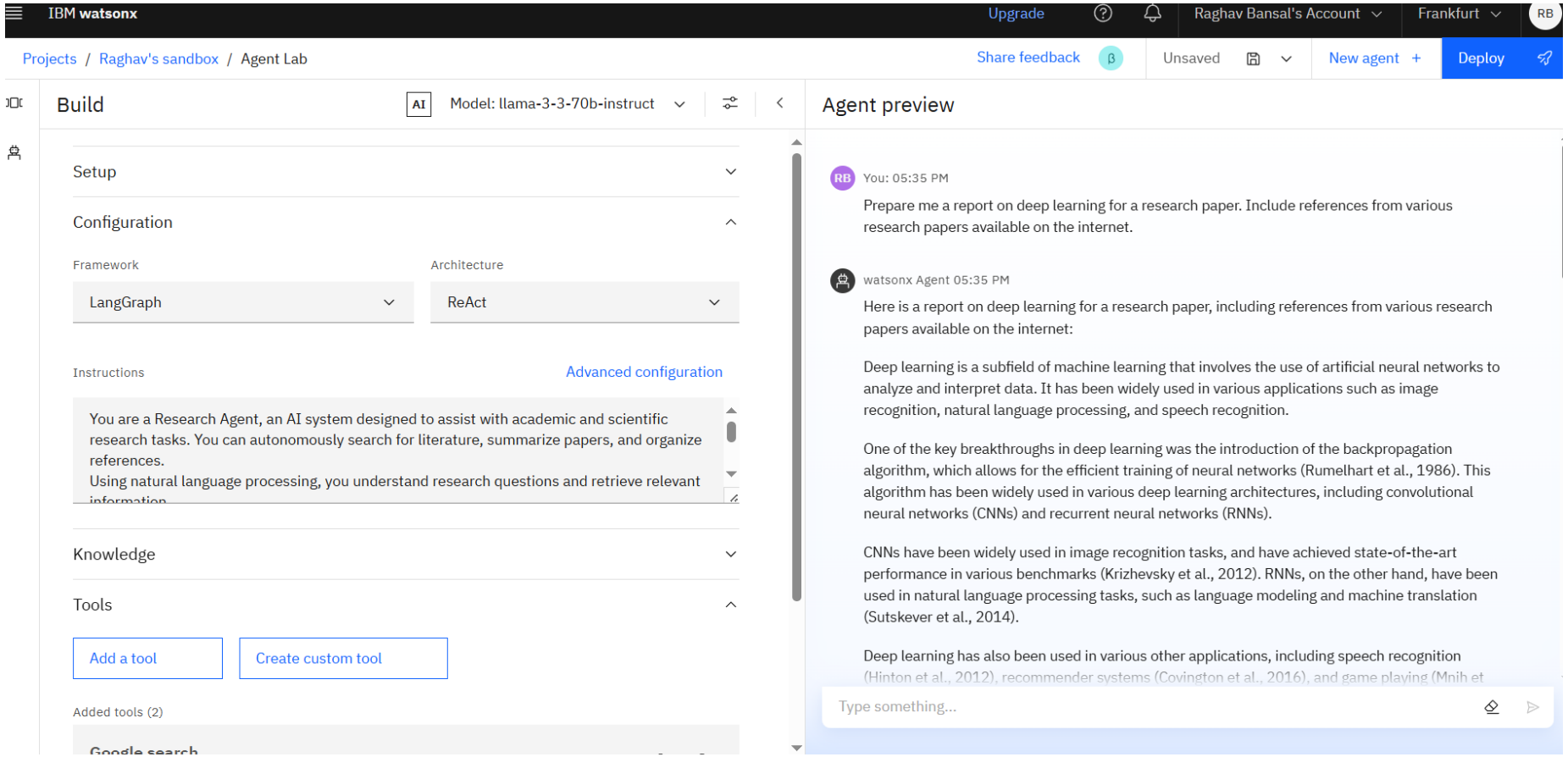
- The proposed system aims to address the challenge of analysing a large amount of data i.e. articles, research papers, etc . The agent will highlight key points, summarize research papers and can prepare detailed reports along with providing the data sources. The solution will consist of the following components:
- First, we prepare a IBM project to start our Agentic AI project.
- We choose required resources like watson.ai studio, watson.ai runtime, CloudObjectStorage, watsonx.governance.
- After preparing the setup, we start with selecting an LLM model for our agent who will analyse all the data and generate a response according to the prompt and query provided.
- The framework used is LangGraph, used to manage the workflow for organised and scalable development.
- The architecture used is ReAct used to make the agent interactive with its environment.
- Now, we prepare a prompt for our agent describing the task and its goal that its need to achieve. The prompt is very important in guiding the agent and in achieving desired results.
- We select the the tools that our agent will use in order to search for required knowledge to fulfill the task. The tools used are Google Search Engine, DuckDuckGo search, and Wikipedia search.
- After this, we test our agent by providing a sample query and if it generates the desired output then our agent is complete, otherwise we can tweek the prompt to increase the accuracy.
- After the agent is completed, we can save the agent.

SYSTEM APPROACH

The proposed solution uses IBM’s watsonx platform and LangGraph framework to develop an Agentic AI system capable of autonomously analyzing large volumes of research data. The agent is built using a ReAct-based architecture for interactive reasoning and action, with a custom prompt to guide its behavior. Tools like Google Search, DuckDuckGo, and Wikipedia are integrated to enable knowledge retrieval. The workflow is designed for scalability and modular development.

RESULT

The Research Agent was successfully tested with academic queries. It could summarize articles, extract key points, and generate well-structured reports along with source links. The agent responded accurately to varied prompts, showcasing its ability to automate time-consuming research tasks efficiently.



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CONCLUSION

- The Research Agent demonstrates how Agentic AI systems can transform the research process by automating literature analysis, information retrieval, and content generation. Leveraging IBM watsonx and LangGraph, the system offers a scalable and interactive solution to streamline academic and industrial research workflows.

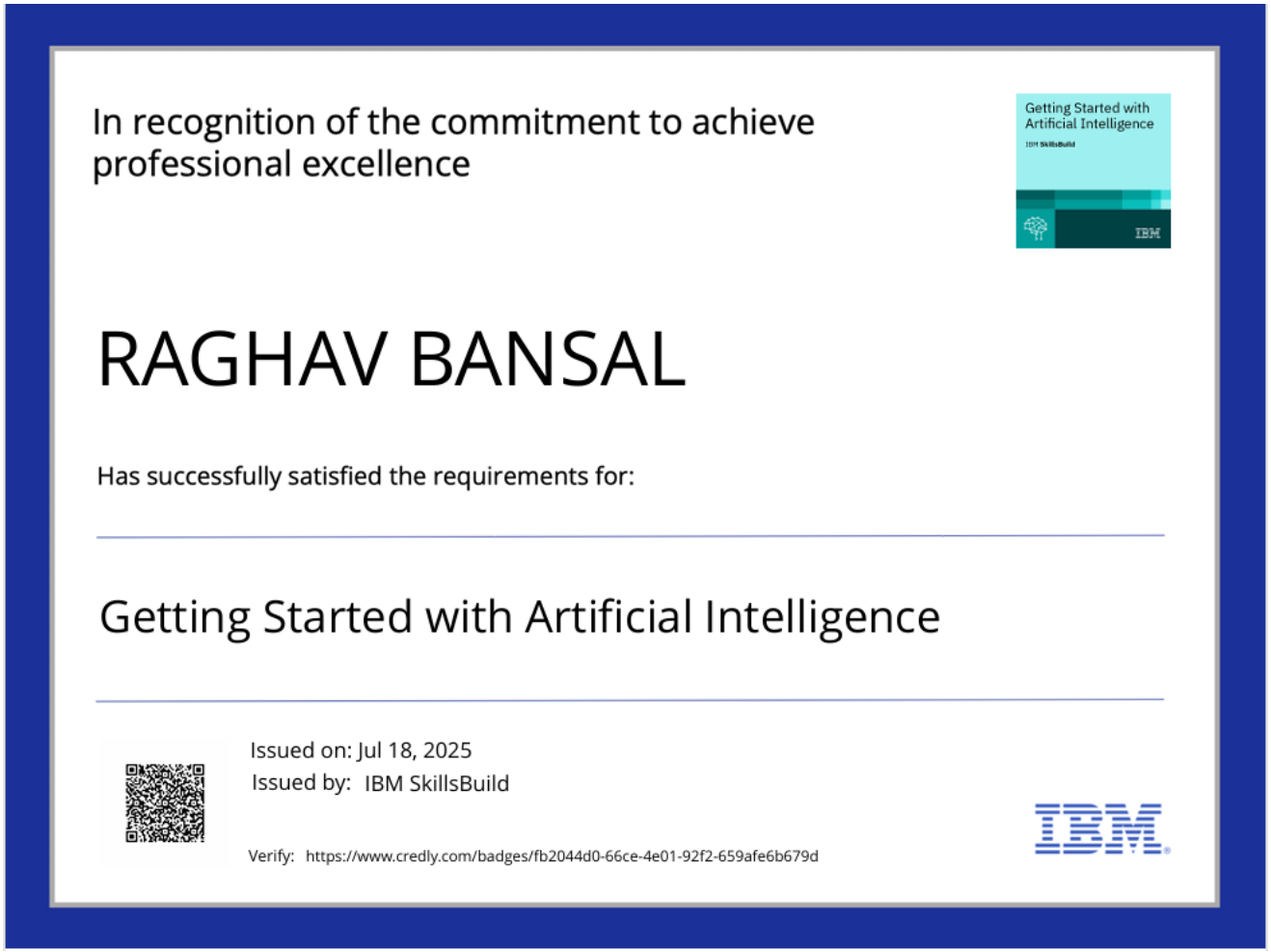
FUTURE SCOPE

- Expand knowledge sources
- Enable real-time data extraction from PDFs
- Add support for domain-specific agents
- Deploy the agent as a web-based research assistant

REFERENCES

- IBM watsonx.ai Studio and Runtime
- LangGraph Documentation
- Wikipedia, Google Search, DuckDuckGo APIs
- Project-specific test data and prompts
- Also the sessions taken by the mentors in IBM skillsbuild internship.

IBM CERTIFICATIONS



IBM CERTIFICATIONS

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Has successfully satisfied the requirements for:

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According to the Adobe Learning Manager system of record

Completion date: 24 Jul 2025 (GMT) **Learning hours:** 20 mins

THANK YOU

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