SCIENTIFIC PAPER DISCOVERY

Using Rag | arXiv

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Project link :

https://github.com/Tharun-Rv/Scientific-paper-discovery

Scientific Paper Discovery using RAG

1. Introduction

Welcome to Scientific Paper Discovery (RAG + Evaluation)!

This tool lets users enter any research topic and fetch relevant, real-time scientific papers from arXiv. It uses a Retrieval-Augmented Generation (RAG) pipeline to answer questions and summarize content from the papers.

Built with:
- ArXiv API for live paper fetching
- RAG using Transformers
- Evaluation of summary & retrieval quality
- Gradio UI for a friendly interface

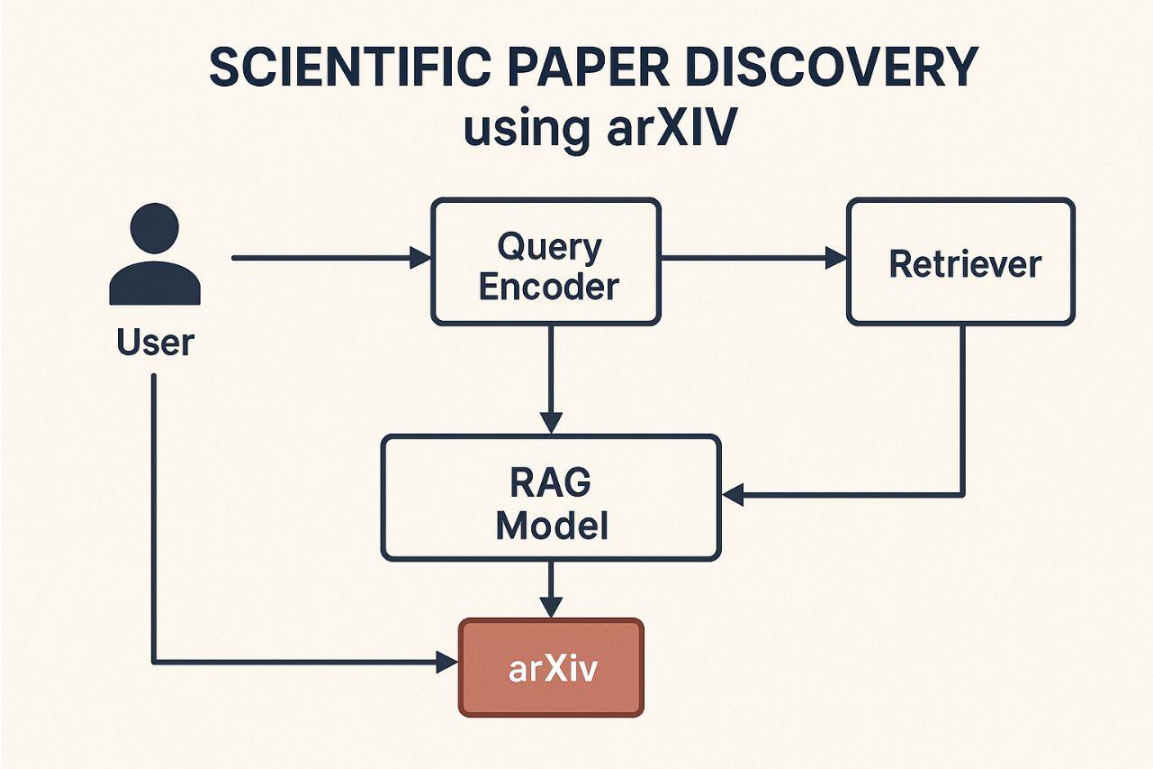
2. Scope of the Project

- Research Topic Exploration: Users enter a topic or keyword to fetch relevant arXiv papers.
- Real-Time Retrieval: Dynamically pulls the latest papers using the arXiv API.
- Summarization & Answer Generation: Summarizes insights from retrieved papers.
- Quality Evaluation: Evaluates summary relevance and accuracy.
- No-Code Interface: Gradio UI for easy use.
- Extensible: Can be expanded to other scholarly APIs or domain-specific filters.

This acts as a smart assistant for faster literature review and research discovery.

4. System Architecture Diagram

Below is a conceptual diagram of the system architecture used:



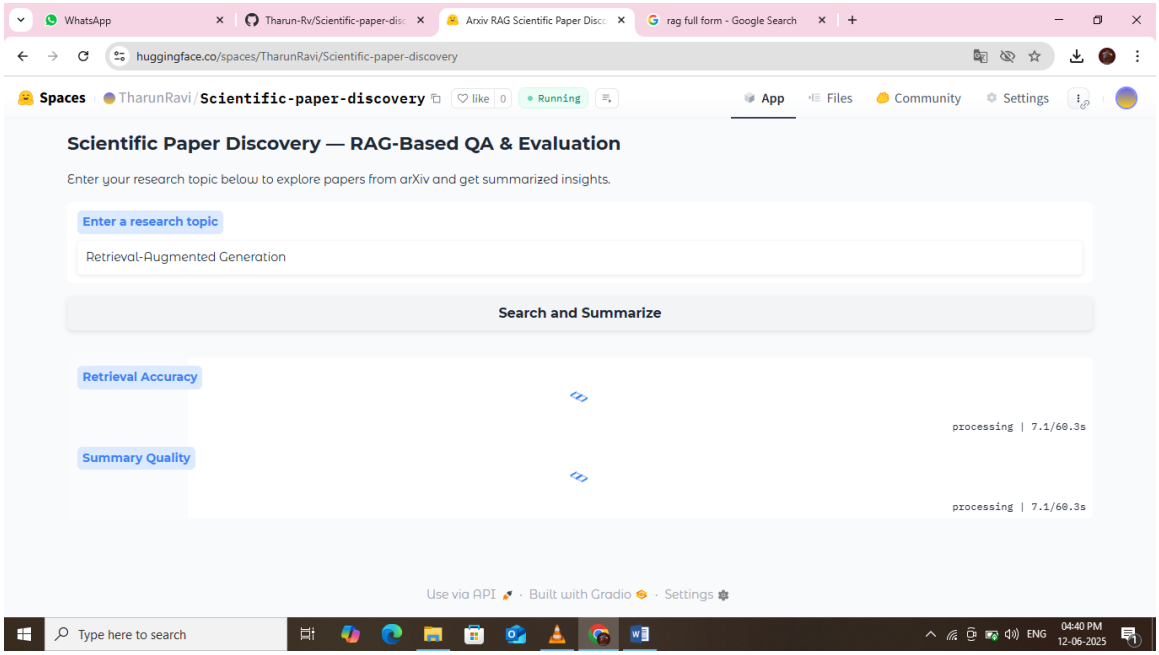
5. Modules Explanation

1. User Interface Module (Gradio): Accepts research topic input and displays results.
2. ArxivLoader: Fetches the most recent papers based on user query.
3. Embedding & Retrieval Module: Embeds abstracts using sentence-transformers, then finds relevant papers.
4. RAG Model Pipeline: Performs question answering and summarization from the retrieved data.
5. Evaluation Module: Uses similarity metrics to assess summary and retrieval quality.

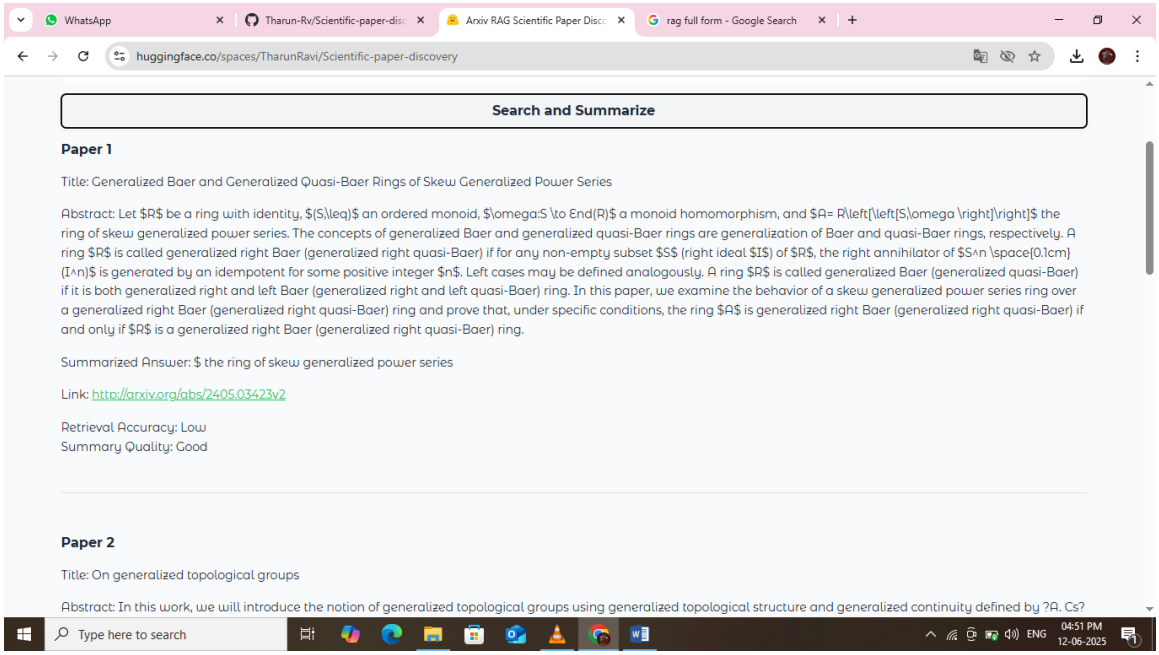
6. Sample Outputs

Example: Entering query 'quantum computing' returns latest arXiv papers and generates a summary. It also answers custom questions like 'What are the latest methods in quantum computing?'

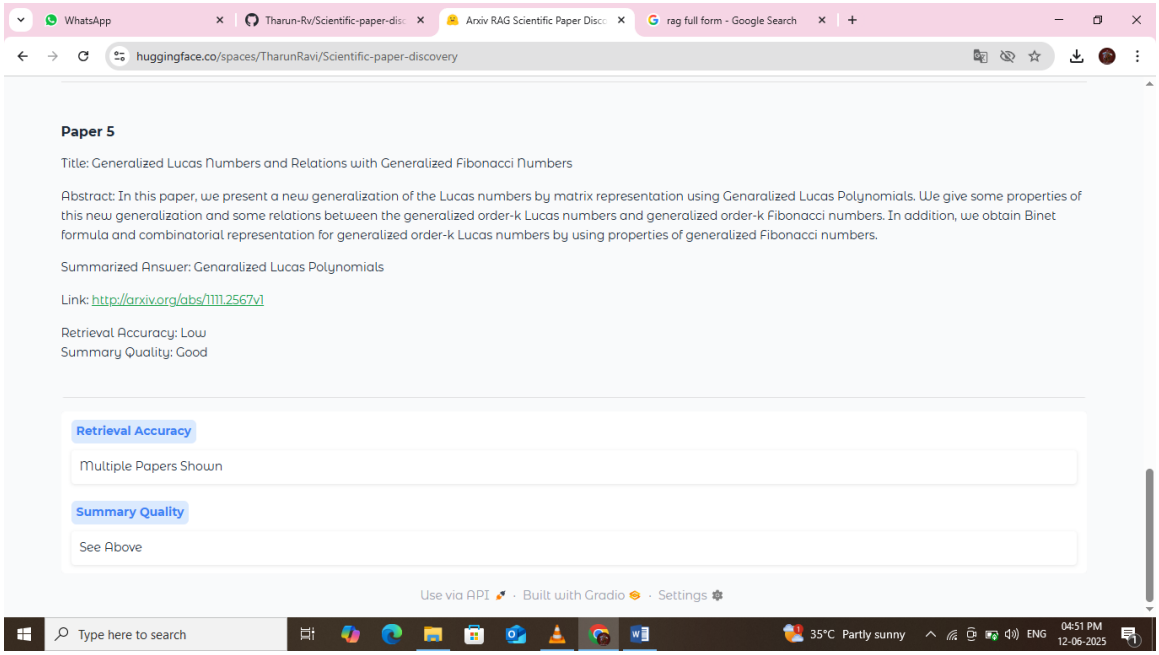
6.(a) Sample Output page [i]



6.(a) Sample Output page [ii]



6.(a) Sample Output page [iii]



7. Conclusion

This project delivers a powerful and user-friendly platform for discovering, retrieving, and understanding scientific papers from arXiv using Retrieval-Augmented Generation (RAG). With live fetching, summarization, and evaluation — it simplifies the literature review process and empowers researchers with quick, insightful overviews.

8. References

- arXiv API: https://arxiv.org/help/api
- Hugging Face Transformers: https://huggingface.co/transformers
- Gradio: https://www.gradio.app
- Sentence-Transformers: https://www.sbert.net/