Geni: Accelerating Research Innovation

An LLM-powered research idea generator for modern researchers

Research Pain Points

Generating impactful research ideas is one of the most critical and challenging steps in the research process. Researchers and students often face a lack of direction when deciding which research topics to pursue. The sheer volume of existing knowledge, combined with the rapid pace of advancements, makes it difficult to identify areas where a new contribution would be most meaningful. A dedicated solution to streamline this process could significantly enhance the research experience and productivity.

Leveraging LLMs To Ideate

We propose a system powered by large language models that helps researchers systematically generate and evaluate research ideas. Key features of the system include:

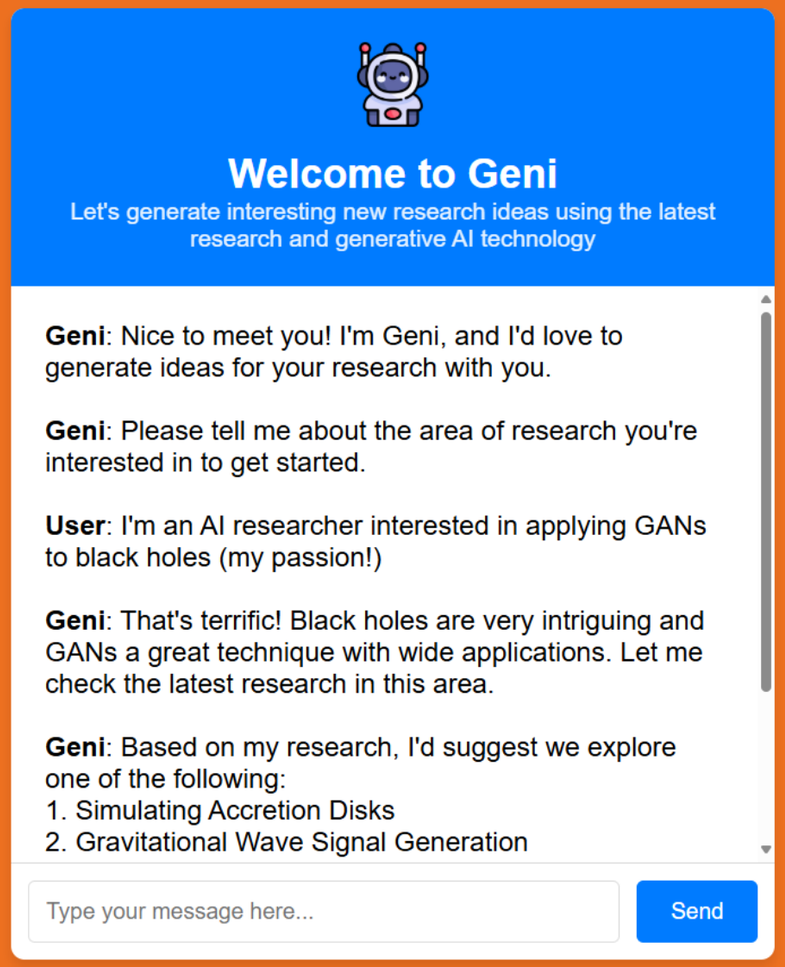
- Open interface for generating ideas aligned with the researchers domain and goals.
- Automated evaluation of idea feasibility and potential impact using knowledge from existing research papers.
- Integration with external tools to provide context, such as related papers or datasets, to support the generated ideas.

Where Are We Now?

Research idea generation has been significantly advanced by generative AI. Current systems leverage fine-tuned LLMs to support ideation by synthesizing knowledge, identifying gaps, and generating innovative concepts. These systems apply techniques like RLHF and RAG, enabling them to provide contextually relevant and actionable insights.

Despite their potential, challenges persist, including reliance on the quality of training data and the difficulty of tailoring models to specific domains.

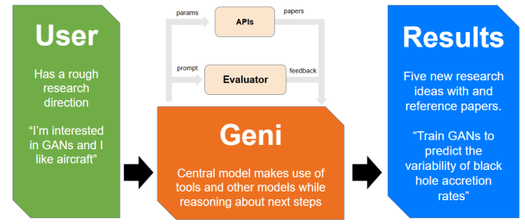
Generate research ideas by chatting with your personal research assistant



FIRST AUTHOR JYE SAWTELL-RICKSON
SECOND AUTHOR RAYMOND LIN
THIRD AUTHOR GUO-WEI CHEN

Living Agent Workflow

Geni is a collection of LLM ReAct agents that have access to live APIs allowing them to reason and discover new research ideas grounded in current research.



ReAct agents combine reasoning and acting by interleaving reasoning traces and task-specific actions with interpretable task-solving trajectories, improving decision-making. By interacting with external environments they overcome hallucination and error propagation in LLMs.

Geni leverages:

- Research APIs: latest research.
- LLMs: Qwen2.5 (14b) via Ollama.
- LangGraph: managing agents and UX.
- Flask: for web interface.

Geni's Impact

Geni has shown good qualitative results, enabling researchers to brainstorm and refine ideas that they "might not have conceived independently". By presenting a diverse array of potential topics, Geni has saved significant time and enhanced creativity in the early stages of research.

Future Research

The next stages of Geni's development should focus on the following areas:

- **Fine-Tuning**: Enhancing the system's capability to generate tailored research ideas by fine-tuning LLMs on research datasets.
- **Domain Expansion**: currently Geni supports limited research domains, it could be expanded with further publication access.
- **Idea Validation**: develop advanced metrics to assess idea novelty and feasibility using real-world data and domain expert feedback.

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