

Team DevCC

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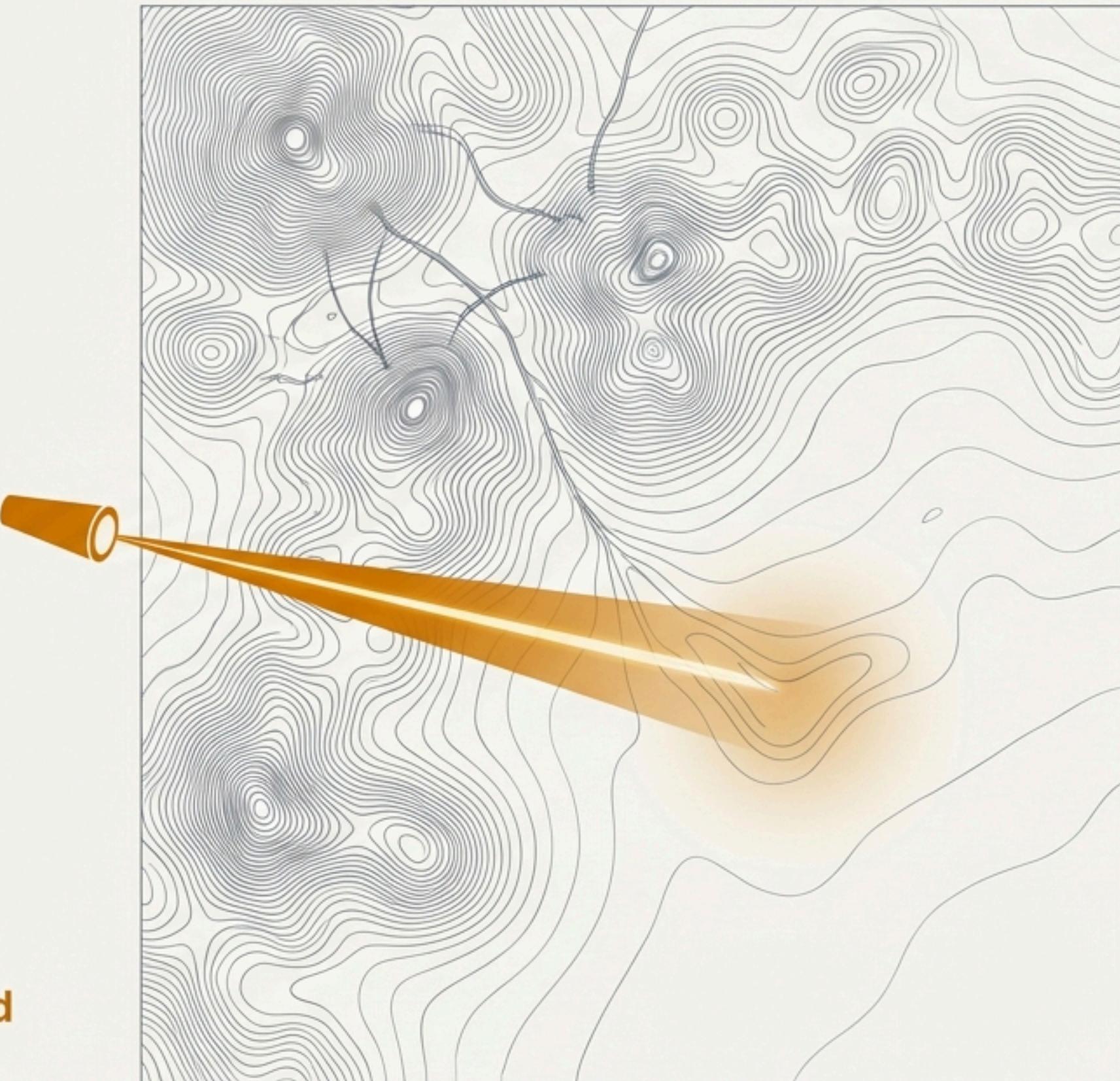
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FrontierMap: The Bleeding-Edge Innovation Engine

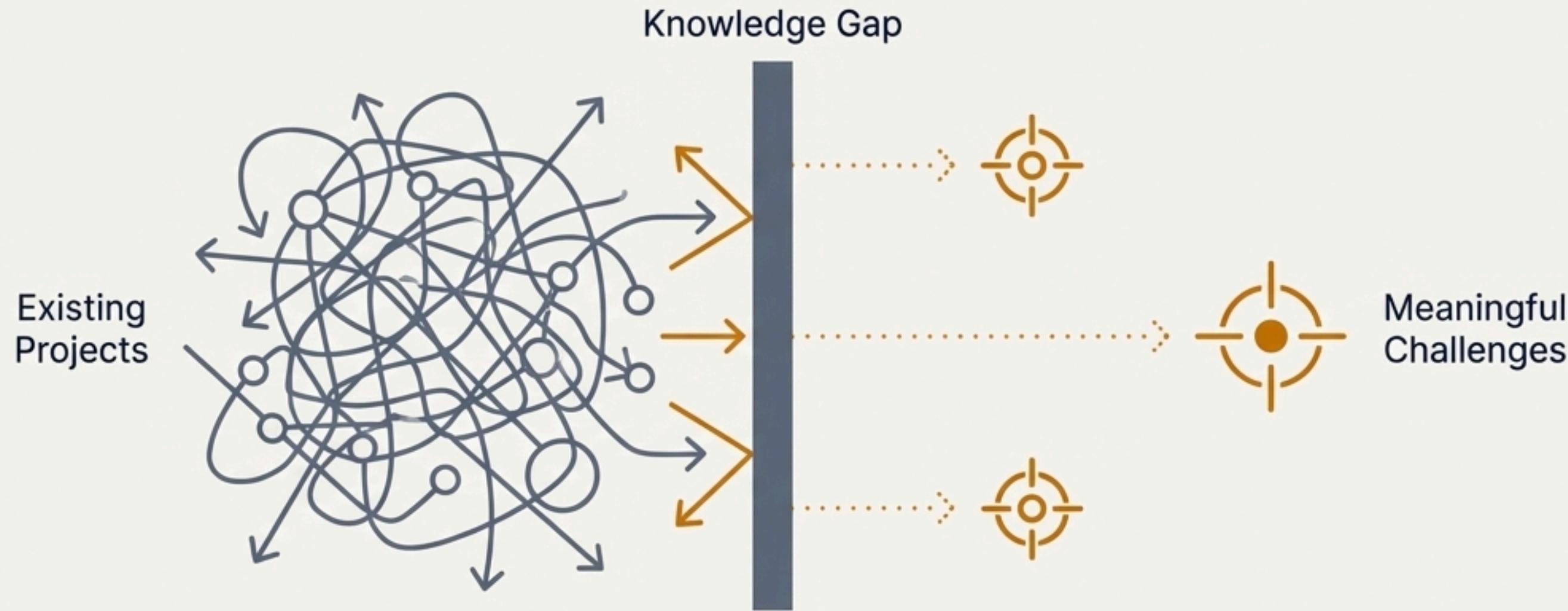
We propose an AI-driven "Innovation Recommendation System" designed to **stop project redundancy** and accelerate genuine problem-solving.

Unlike standard idea generators, FrontierMap aggregates data from scientific repositories (e.g., arXiv) and expert community discussions (e.g., **Reddit**, Stack Exchange) to **maps the current 'Knowledge Frontier.'**

It identifies specific limitations, constraints, and "future work" suggestions in bleeding-edge research, presenting users with **actionable, unsolved problems** rather than generic project titles.



The Problem: A 'Knowledge Gap' Leads to Wasted Potential



Many university students and innovators **waste potential** creating repetitive projects that solve already-solved problems or fail to address current industry challenges.

This occurs due to a "**Knowledge Gap**": students often lack awareness of the immediate boundaries, current limitations, and specific challenges ("bleeding edge") of a field.

There is **no centralized tool** that translates complex "state-of-the-art" limitations into actionable project problem statements.

The Solution: An Intelligence Platform for Problem Discovery



1. Ingests User Interests:

Takes a user's domain (e.g., "Computer Vision for Traffic").

2. Scans the Frontier:

Uses APIs to fetch the latest research papers (last 6 months) and high-engagement technical threads (Reddit/Discord).

3. Extracts Gaps:

Uses an LLM (Large Language Model) to analyze "Conclusion" and "Limitations" sections of papers and thread debates to extract *what is currently failing or missing*.

4. Recommends:

Outputs a "Problem Card" detailing the specific gap, the source of the limitation, and a proposed direction for a solution.

Key Features Driving the Innovation Engine



Gap Analysis Engine:

Automatically detects sentences related to "limitations," "future work," or "current challenges" in technical texts.



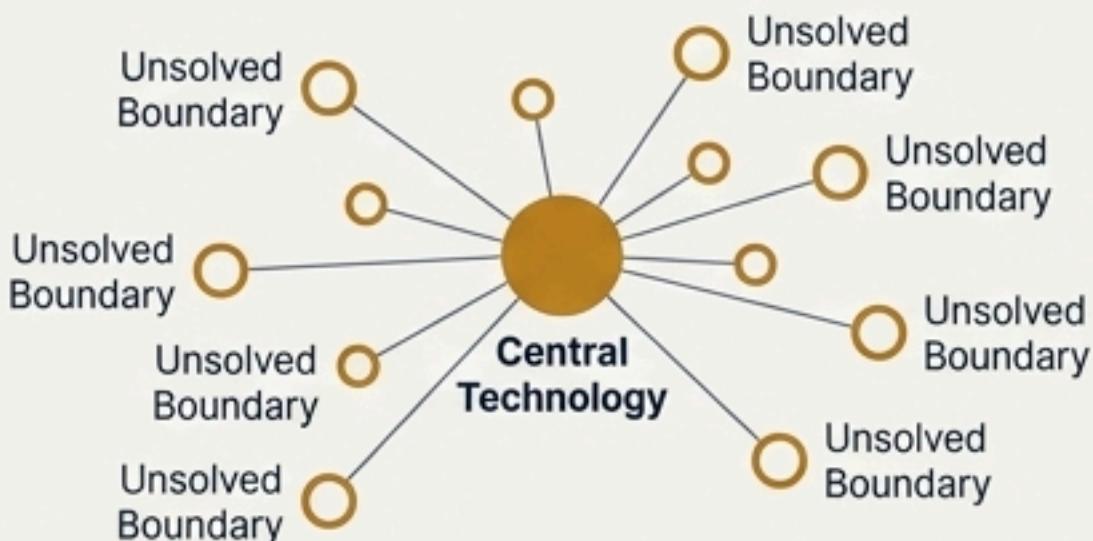
Real-Time "Pulse" Checks:

Aggregates Reddit and HackerNews sentiment to see if a problem is a "hot topic" or a dead end.

Visual Knowledge Graph:

A visual map showing the central technology and its surrounding "unsolved boundary" nodes.

*(Note: AI features like this are an added advantage).

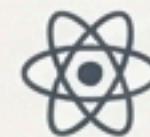


Project "Novelty Score":

Checks a user's proposed idea against a database of existing projects to predict how unique it is.

The Technology Stack: Built for AI Proficiency and Scale

(Selected to highlight Technical Proficiency and AI capabilities)



React.js

Frontend: React.js (for a responsive, interactive node-map interface).



python

Backend: Python (FastAPI or Flask) – chosen for its superior library support for AI/NLP tasks.



OpenAI



HuggingFace

AI/ML: OpenAI API (or HuggingFace open-source models) for Natural Language Processing and summarization; LangChain for orchestration.



Pinecone



MongoDB

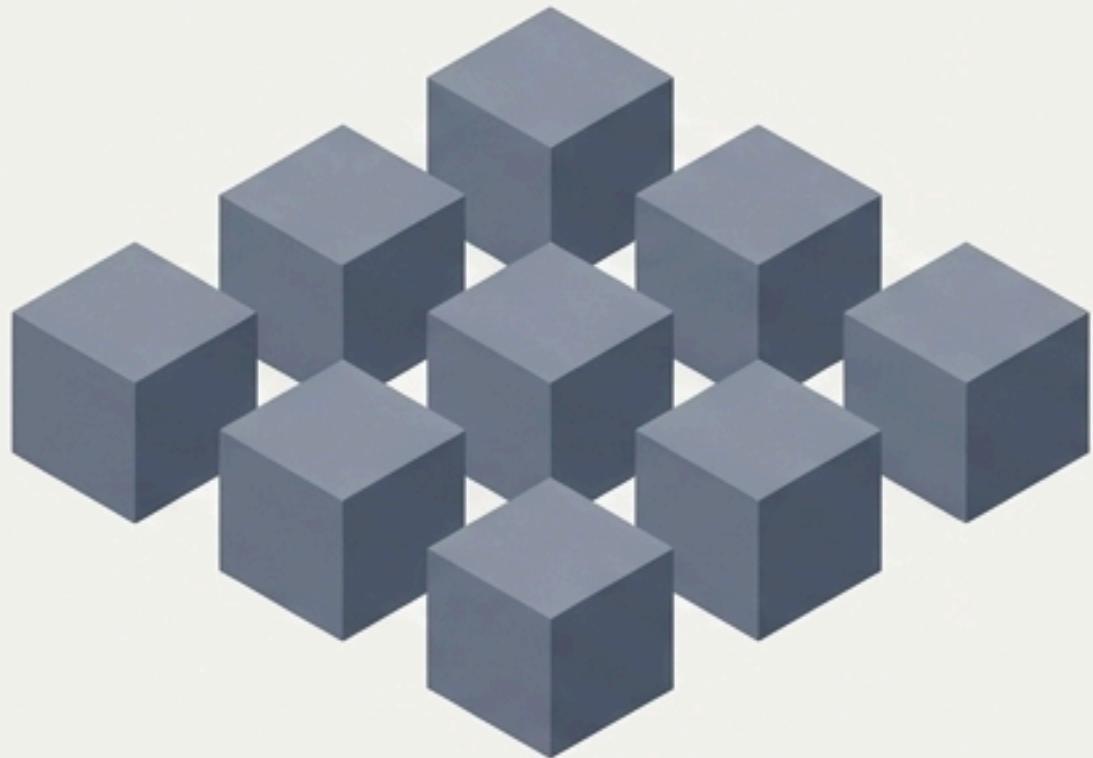
Database: Pinecone (Vector Database) for semantic search of research papers; MongoDB for user data.



APIs: arXiv API (Research), Reddit API (Discussions).

Our Core Innovation: A Paradigm Shift from "What Can I Build?" to "What Needs to Be Built?"

What can I build?



While most student projects focus on *implementation* (e.g., "building a chat app")...

What *needs* to be built?



...FrontierMap focuses on *discovery*. By using AI to process the "Limitations" sections of thousands of papers—a task impossible for humans to do manually—we unlock a database of *actual* scientific needs.

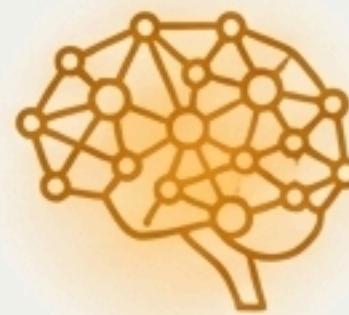
This **shifts the paradigm** from "What can I build?" to "What *needs* to be built?", ensuring every project generated has intrinsic value and novelty.

Feasibility: Achievable Within the Hackathon Timeframe



Data Availability

arXiv and Reddit provide free, public APIs for data access.



Core Technology

Modern LLMs (like GPT-4 or Llama 3) are already capable of high-level summarization and entity extraction, reducing the need to build complex NLP models from scratch.



Scalability

The architecture uses microservices, allowing the extraction engine to run independently of the user interface.



Impact Assessment: A Catalyst for Students, Society, and Research



For Students:

drastic reduction in "throwaway" projects; **higher chance** of producing **research-worthy** work.



For Society:

directs brilliant young minds toward solving *actual real-world bottlenecks* (e.g., specific inefficiencies in renewable energy) rather than hypothetical ones.



Academic Integrity:

encourages deep research and citation over superficial coding.