AI-DRIVEN VISUAL ANALYTICS FOR ADVISOR DISCOVERY

SCHOLAR COMPASS

TEAM 17

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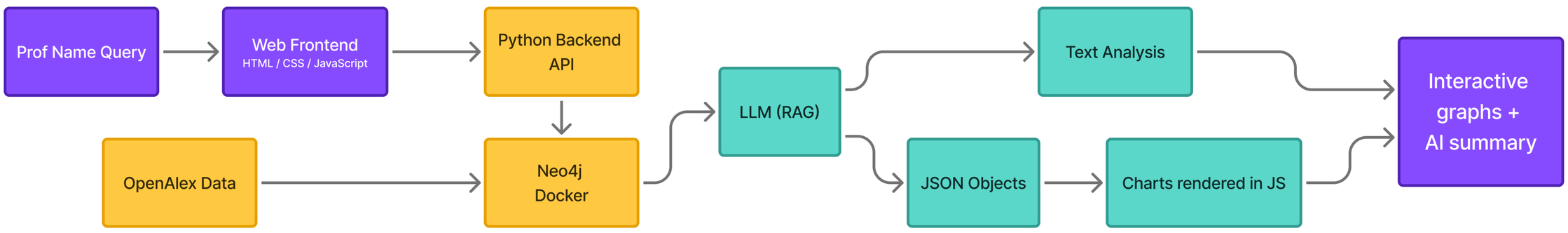
SYSTEM OVERVIEW

Scholar Compass turns a professor name query into an **interactive advisor profile**. A web frontend (HTML/CSS/JS) sends the name to a **Python backend**, which pulls data from a **Neo4j graph** built from **OpenAlex** and feeds it to an **LLM with RAG**. The model returns JSON for charts plus a short narrative, and the frontend renders **interactive graphs and an AI summary** so students can quickly judge advisor fit.

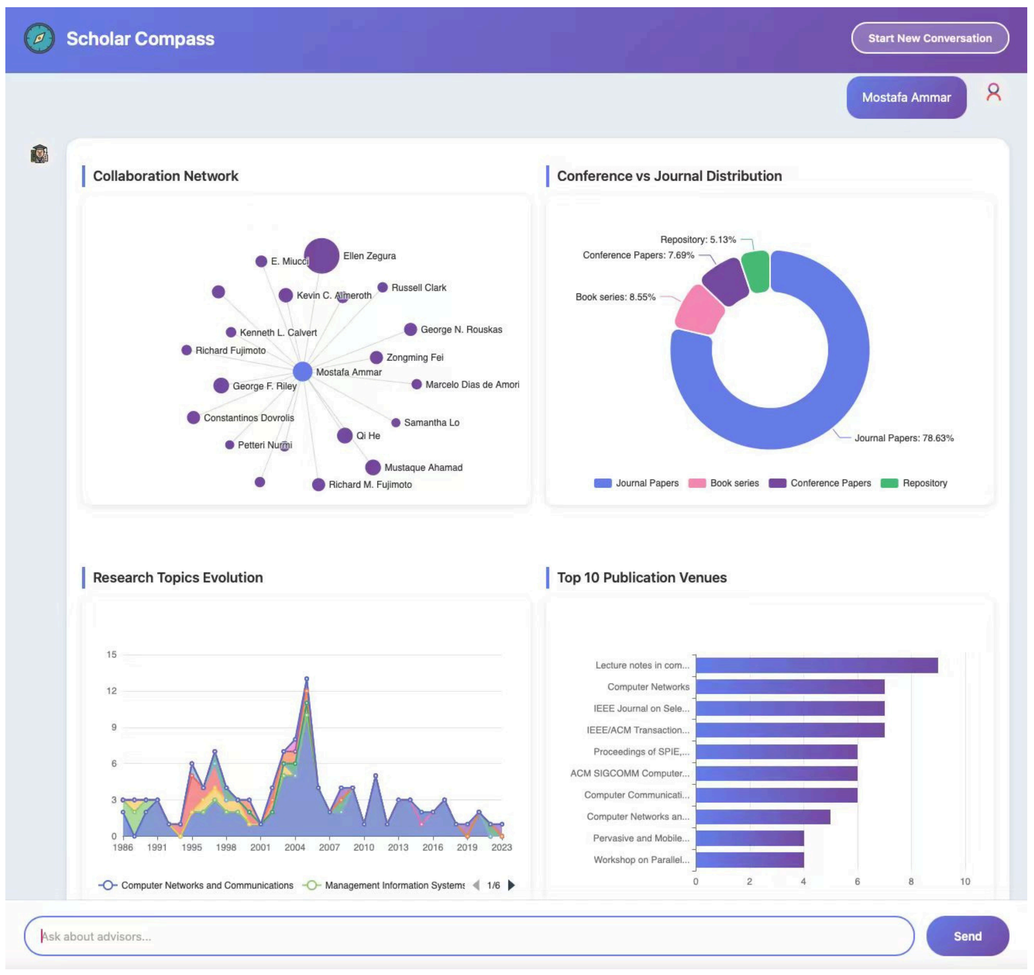


FRONTEND

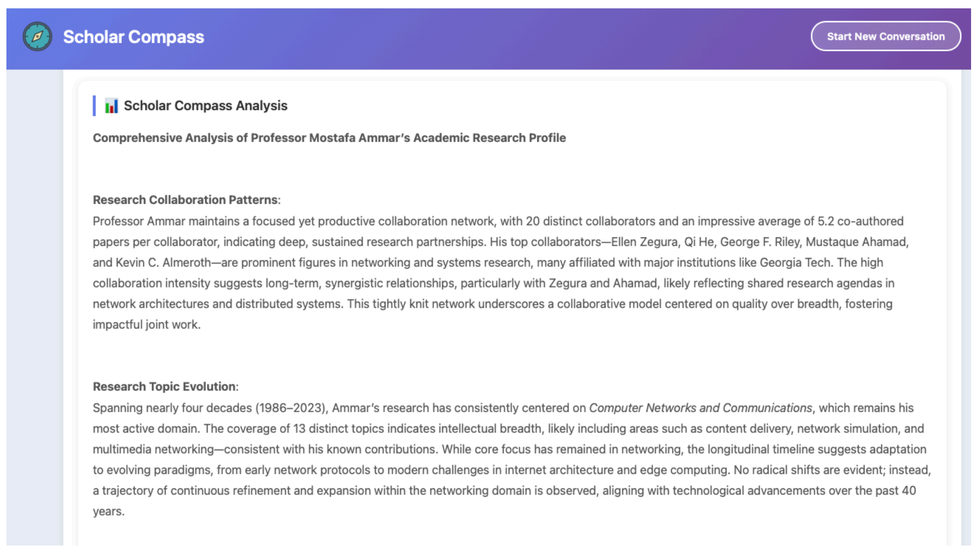
The Scholar Compass frontend is a **single-page dashboard**. Users see four views at a glance: **collaboration network, conference vs. journal split, research topics over time, and top publication venues**. Each chart is interactive with hover tooltips and smooth updates. Below, a **"Scholar Compass Analysis"** panel gives a concise narrative of collaboration patterns, topic trends, publication strategy, and overall profile, turning raw publication data into an intuitive picture of a scholar's career.

BACKEND

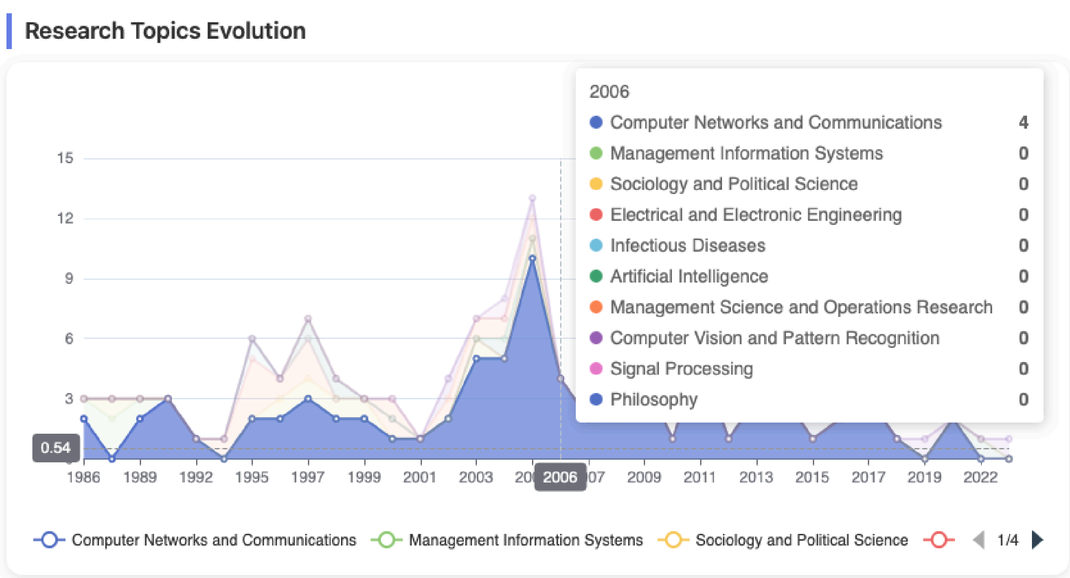
Behind the UI, a **Python backend** orchestrates data and AI. OpenAlex metadata is preprocessed into CSVs and loaded into **Neo4j (Docker)** as a graph of authors, works, venues, and concepts; the API retrieves a focused subgraph for a scholar, computes features like **PageRank** and topic summaries, and feeds this context into an **LLM via RAG**. The model returns three JSON payloads for collaboration, topic, and venue charts plus a structured text analysis, all served through simple **REST endpoints** that keep the system modular and easy to extend.



CASE STUDY: EXAMPLE ADVISOR VIEW



Each chart supports **fine-grained interaction** with hover tooltips and pagination.



EVALUATION

Scholar Name	Target Chart	Ground Truth (DB)	AI Response	Result
Mostafa Ammar	Network Graph	Ellen Zegura	Ellen Zegura	**Pass**
Mostafa Ammar	Venue Chart	Lecture notes in Computer Science	Lecture notes in Computer Science	**Pass**
Mostafa Ammar	Topic Chart	Computer networks	Computer networks	**Pass**
Yao Xie	Network Graph	Liyan Xie	Liyan Xie	**Pass**
Yao Xie	Venue Chart	IEEE Journal on Selected Areas	IEEE Journal on Selected Areas	**Pass**
Yao Xie	Topic Chart	Electrical and Eletronic Engineering	Electrical and Eletronic Engineering	**Pass**

API	Method	Payload	Total Duration	Server Processing (Waiting)	Download
/collaboration-network	POST	6.2 KB	892.95 ms	572.90 ms	0.50 ms
/topic-evolution	POST	9.2 KB	899.25 ms	578.68 ms	0.53 ms
/venue-stats	POST	1.7 KB	902.43 ms	584.02 ms	0.41 ms
/analyze (SSE Streaming)	POST	5.5 KB	11.32 s	1.46 s + streaming 9.86 s	9.86 s

CONCLUSION & FUTURE WORK

Scholar Compass shows that combining **graph-based data, RAG-powered LLMs, and interactive visualizations** can make advisor discovery more transparent and student-centered. It already supports **name-based queries** over a large open dataset and presents **quantitative views plus AI commentary** in one interface. Future work includes adding more data sources and filters, running larger formal user studies, and examining **fairness and bias** in advisor recommendations.