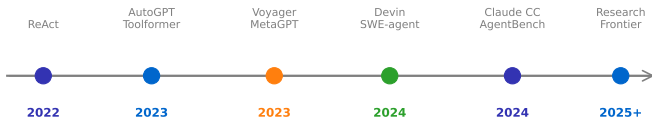


Research Frontiers

Week 12: Open Problems and Future Directions

PhD Course in Agentic Artificial Intelligence

Agent Research Timeline

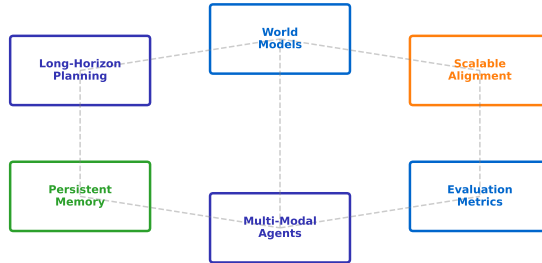


Themes: Reasoning > Tool Use > Multi-Agent > Production

reasoning (2022) to production systems (2024) in just two years.

From

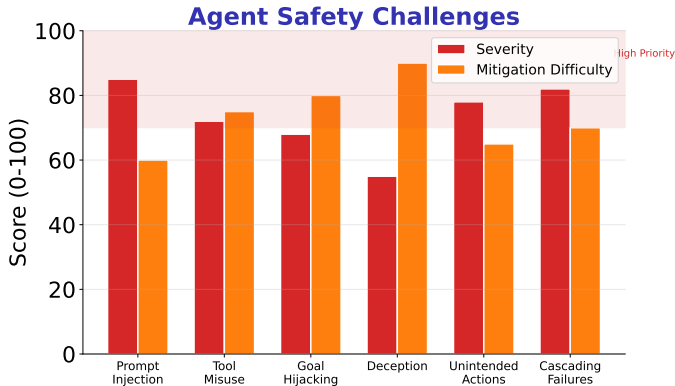
Open Research Problems



Interconnected challenges requiring holistic solutions

interconnected challenges define the research agenda.

These



research is critical for responsible agent deployment.

Safet

Future Research Directions



Cross-cutting: Safety | Alignment | Interpretability | Evaluation

Key insight: Progress requires interdisciplinary collaboration

requires interdisciplinary collaboration.

Progr

Foundational

- Wang et al. (2023). “Voyager: An Open-Ended Embodied Agent.” arXiv:2305.16291
- Park et al. (2023). “Generative Agents: Interactive Simulacra.” arXiv:2304.03442
- Bai et al. (2022). “Constitutional AI.” arXiv:2212.08073

Perspectives

- Anthropic (2024). “Agent AI: Surveying the Horizons.”

papers define the frontier of agent research.

These

12-Week Journey

- **Foundations:** Agents, LLMs, ReAct, prompting (W1-2)
- **Capabilities:** Tools, planning, multi-agent (W3-5)
- **Frameworks:** LangGraph, AutoGen, production (W6)
- **Knowledge:** RAG, GraphRAG, verification (W7-9)
- **Applications:** Evaluation, domains, frontiers (W10-12)

Key Takeaway

- Agents = LLM + Memory + Tools + Planning + Evaluation

you for participating in this course!

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