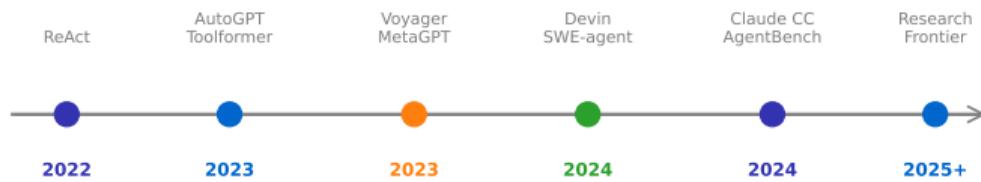


Research Frontiers

Week 12: Open Problems and Future Directions

PhD Course in Agentic Artificial Intelligence

Agent Research Timeline

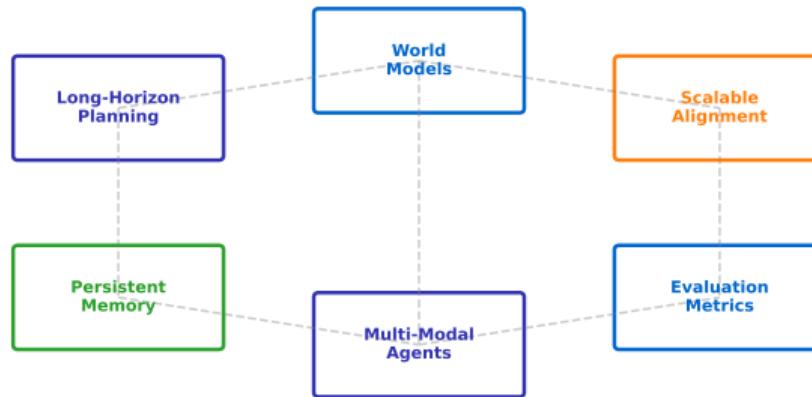


Themes: Reasoning > Tool Use > Multi-Agent > Production

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

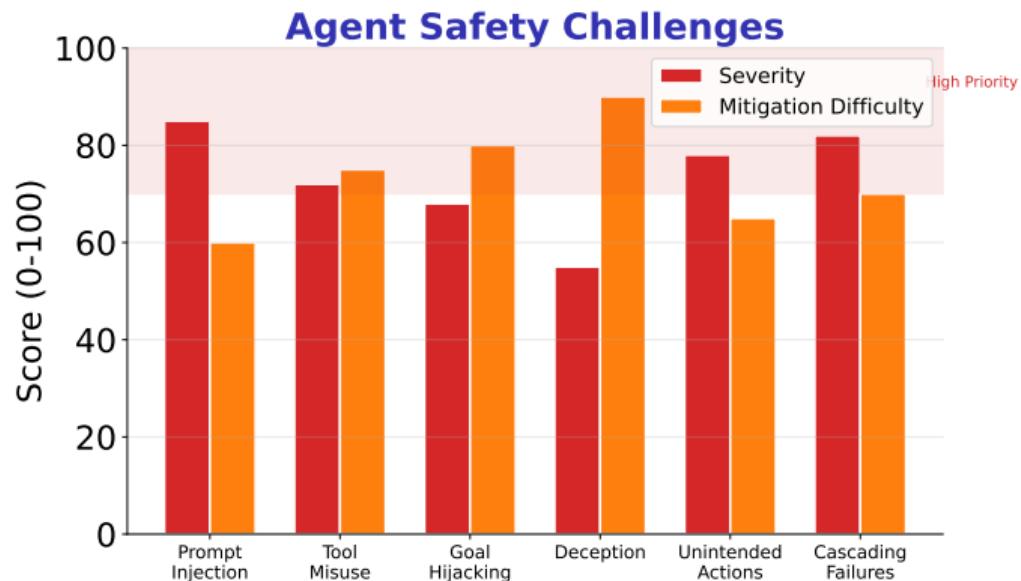
From

Open Research Problems



interconnected challenges define the research agenda.

These



research is critical for responsible agent deployment.

Future Research Directions



Cross-cutting: Safety | Alignment | Interpretability | Evaluation

Key insight: Progress requires interdisciplinary collaboration

requires interdisciplinary collaboration.

Prog

Foundational

- Wang et al. (2023). "Voyager: An Open-Ended Embodied Agent (physical/virtual world)." arXiv:2305.16291
- Park et al. (2023). "Generative Agents: Interactive Simulacra (simulated personas)." 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.

The

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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