LLM Solutions for Lack of Knowledge

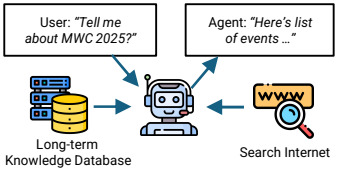
Training / Fine-tuning with the Missing Knowledge

Domain-specific knowledge: *"RIS stands for Reconfigurable Intelligent Surface ..."*

Latest news and updates : "During the Mobile World Congress 2025 event, ..."

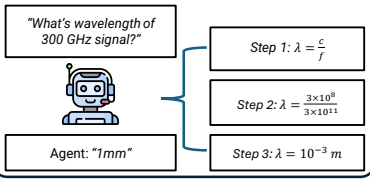
Agentic Solutions for Lack of Knowledge

Retrieval-augmented Generation



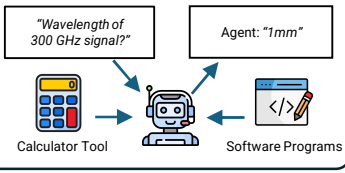
LLM Solutions for Computation Capability

Chain-of-thought or Tree-of-thought Reasoning



Agentic Solutions for Computation Capability

Use Tools or Write Programs



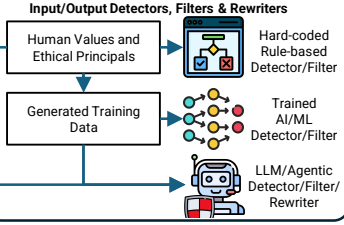
LLM Solutions for Value Alignment

Training / Fine-tuning with Value Alignment Dataset

Activation Engineering to Steer Generation Direction

Agentic Solutions for Value Alignment

Input/Output Detectors, Filters & Rewriters



LLM Solutions for Jailbreak, Backdoor and Injection attacks

- **Training / Fine-tuning with Adversarial Alignment Data**
- **Activation Engineering to Steer Generation Direction**

Agentic Solutions for Jailbreak, Backdoor and Injection attacks

Input/Output Detectors, Filters & Rewriters

Solutions for Malicious Tool/Program Runs

Offline Certification: formally verify the safety boundary or constraints of tools

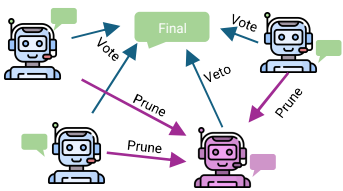
Online Guards: introduce guardrail rules, Temporal Logic monitors, AI/ML detectors or agents pre/post processors

Online Verification: verify the tool calls in digital twins

Online Isolation: execute tools/programs in an isolated environment with fine-grained data/memory access

Solutions for Agent Infection

Multi-agent collaborative defence against harmful responses and malicious agents.



Downside of Guardrail Techniques

Extra Attack Surface
e.g., exploiting overzealous safety mechanism to mark benign user requests as unsafe (false positive) for DoS attack

Fast but Brittle
Rule-based detectors or filters are fast but can never exhaust all the possibilities

Limited Transferability
For LLM-based guards, for instance, a guard model trained for LLaMA might not calibrate well for GPT-3.5

Extra computation and latency
Stacking up guards, especially AI/ML/Agent models consume extra computation resources and incur additional latency.