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Comprehensive Review of Artificial General Intelligence AGI, Agentic AI and GenAI: Current Trends and Future Directions

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Abstract This paper presents a comprehensive review of Artificial General Intelligence (AGI) and Agentic AI, examining their technological foundations, current capabilities, and future trajectories. The study identifies key technical distinctions between these AI paradigms, including their architectural requirements, computational demands, and learning mechanisms. We survey the current technical landscape, including specialized frameworks like OpenAI's AGI classification system and emerging Agentic AI platforms such as Vectara-agentic and CrewAI. The paper also examines the hardware infrastructure and cloud services enabling these advanced AI systems, from NVIDIA's specialized GPUs to large-scale projects like OpenAI's proposed "Stargate" initiative and others. Our comparative analysis reveals that Agentic AI is rapidly transitioning from research to practical deployment across industries including legal services, DevOps, and enterprise automation, while AGI remains in the research phase with ongoing debates about its feasibility and timeline. The paper discusses critical challenges in both domains, including safety considerations, alignment problems, and governance requirements. We highlight how Agentic AI serves as a bridge between today's generative AI capabilities and future AGI aspirations, offering autonomous functionality while avoiding some of AGI's unresolved risks.