Toward a Distributed AI System Orchestration Platform

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Abstract

The hardware and software technologies that support AI applications are being developed and released at a rapid pace. Commercial and government entities have boosted efforts to create AI-enabled systems that leverage these advancements: from autonomous cars to fleets of UAVs. However, it is difficult to manage the development and testing of these systems due to the complexity of integrating heterogeneous sensing, actuation, and decision making components. Another challenge is that many solutions implement a sense-plan-act cycle within vertically integrated mission management software that limits the flexibility to experiment with new algorithms and hardware. This paper presents an architecture and orchestration platform that enables the flexible development, integration, and testing of AI-enabled systems. Although this architecture is applied to autonomous vehicles, its principles could be applied to other distributed AI applications that include human-machine teams and systems. The efficacy of this orchestration platform is demonstrated with a simulated unmanned aerial vehicle within the open source Ardupilot software-in-the-loop simulator.