Bridging the Gap: AI-Driven Agent-Based Systems in Modern Software Engineering

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Abstract:

Agent-based systems (ABS) are the newest and most effective approach in software engineering to solve complex, chaotic, and interconnected problems. Since ABS models the systems as the agents that communicate with each other, it is an effective approach to creating flexible software. This paper aims to discuss the possibility of applying agent-based systems to software engineering with a focus on the opportunities and challenges and further research directions. This paper presents a conceptual model that demonstrates the connections between the agents, their surroundings, and the software engineering process. The study also creates an AI-Driven Agent-Based System Development Framework (AI-ABSD Framework) that uses machine learning (ML) and artificial intelligence (AI) in the Agent-Based System Development Life Cycle (ABSDLC). This framework was created because of the growing need for very smart, self-guiding, and emotionally intelligent computers. Based on a case study, empirical validation, and comprehensive evaluation, the paper ends with a perspective of the future of ABS in software engineering, highlighting how it can change the approach to developing software systems.

Keywords:

Agent-Based Systems (ABS), AI-Driven Framework, Agent-Based System Development Life Cycle (ABSDLC), Machine Learning (ML) in Software Engineering, Artificial Intelligence (AI) Applications, Reinforcement Learning (RL), Emotional Modeling in Agents, Smart Traffic Management Systems, Multi-Agent Systems (MAS), Intelligent Transportation Systems (ITS), Human-Agent Collaboration.