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SWARM ROBOTICS FOR HIGH-THROUGHPUT PHARMACOVIGILANCE SCREENING

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Abstract:

Traditional pharmacovigilance systems have several limitations, such as polypharmacy, misinformation, underreporting, scalability, and reporting bias. These challenges can be addressed using High-Throughput Screening (HTS) systems and artificial intelligence. But this system is centralized, which poses some challenges. To overcome those challenges, swarm-based pharmacovigilance through HTS is proposed, a decentralized multi-agent system that coordinates many simple robots to complete the task as quickly as possible. The architecture of swarm robotics contains five components. They are data ingestion, swarm agent layer, coordination and communication layer, AI analytics layer, and decision support layer. This system has advantages such as improved scalability, minimized detection time, prediction accuracy, and improved transparency that increases regulatory trust. Validation metrics such as sensitivity and specificity showed increased performance when external validation was done. Swarm-based pharmacovigilance shows a paradigm shift toward decentralized, adaptive, and intelligent pharmacovigilance.

Keywords: Decentralized system, paradigm shift, improved transparency, external validation.