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Generalized Maintenance Scheduling System

Multi-model maintenance scheduling system to coordinate relevant stakeholders across a distributed system.

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Modern maintenance scheduling systems face increasing complexity due to dynamic operational environments and the diverse objectives of multiple stakeholders. This poster highlights the need for innovative approaches in designing digital maintenance scheduling systems capable of addressing these challenges.

We introduce a novel multi-threaded scheduling framework where each thread functions as an autonomous actor. Each actor embodies a metaheuristic algorithm that dynamically models the decision-making processes of individual stakeholders. By incorporating real-time user inputs and optimizing around disturbances, these actors adaptively adjust their scheduling decisions to respond to changing conditions.

The actor-based metaheuristics operate concurrently, coordinating with one another in real time to align local decisions with global scheduling objectives. This coordination ensures that the overall system remains robust and efficient despite uncertainties and fluctuations in the operational environment.

The poster will present the mathematical models underlying each type of actor-based metaheuristic, detailing their formulation and interaction within the system. These models capture the dynamic behaviors and constraints of individual stakeholders, enabling the actors to make informed decisions. We will demonstrate through simulations how the integration of real-time user inputs and inter-actor coordination leads to improved scheduling performance in maintenance operations.

This research contributes to the advancement of digital maintenance scheduling by providing a scalable and adaptive solution. By bridging individual stakeholder requirements with collective operational goals, the proposed system enhances flexibility, responsiveness, and efficiency in complex scheduling environments.

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