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# Optimization-Simulation approach for the vehicle routing problem with time windows and synchronized visits under travel and service time uncertainty

In this presentation, we address the vehicle routing problem with time windows and synchronized visits under uncertain service and travel times. Specifically, a subset of clients require simultaneous service by two vehicles, which is initiated only after the arrival of both vehicles and, consequently, enforces a waiting period for the vehicle that arrived earlier. To tackle this problem, we propose an optimization-simulation framework. Through an iterative process, a deterministic optimization model generates potential solutions which are then assessed through a simulation model. If the solution is found to lead to a bad average performance, new constraints and penalties are added to the deterministic optimization model. This iterative process continues until the performance criteria are satisfied. We validate our approach through experiments on benchmark instances from the literature.

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