

ORAL PRESENTATIONS

AI-Driven Optimization strategies exploring combinatorial landscape with AI/ML-Driven Metaheuristics

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This presentation explores the synergy between AI techniques, including Reinforcement Learning (RL) and Machine Learning (ML), and metaheuristics in solving combinatorial optimization problems (COPs). We focus on two novel methods for enhancing the performance of the Variable Neighborhood Search (VNS) metaheuristic when applied to the Capacitated Vehicle Routing Problem (CVRP). The first method, Bandit VNS, integrates RL using the Multi-Armed Bandit approach into the VNS framework, achieving over 25% improvement in solution quality. The second method employs ML techniques, specifically Random Forests and Light Gradient-Boosting Machine (LightGBM), for intelligent neighborhood selection in VNS, significantly improving solution quality and computation time. By fusing AI techniques and metaheuristics, we demonstrate the potential to tackle complex combinatorial problems more effectively and efficiently.