

# Adaptive Large Neighborhood Search

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## Abstract

Adaptive Large Neighborhood Search (ALNS) is a metaheuristic that extends the Large Neighborhood Search heuristic (LNS) proposed by Paul Shaw. While traditional LNS employs a single method for destroying and repairing solutions iteratively, ALNS introduces multiple such methods. The algorithm keeps track of the performance of each method and attempts to utilize the best methods for the instance at hand. ALNS allows the user to incorporate domain-specific knowledge by adding tailored destroy and repair methods that can exploit the problem's structure or even be targeted at a subset of the instances that need to be solved.

This talk briefly introduces the ALNS algorithm and explores applications to timetabling problems. We discuss the relationship between ALNS and hyperheuristics and review efforts to parallelize ALNS. Additionally, we explore the integration of machine learning into ALNS, particularly focusing on enhancing the selection of destroy and repair methods.