

AILS-II in C – Overview

AILS-II (Adaptive Iterated Local Search II) is a metaheuristic widely used for solving vehicle routing problems, particularly variants of the Capacitated Vehicle Routing Problem (CVRP) and extensions such as time windows. In this work, we employ a version of AILS-II that has been completely rewritten in the C programming language, with a strong focus on computational performance, explicit memory control, and suitability for large-scale experimental studies.

The reimplementation in C preserves the core logic of the original AILS-II, which is based on iterative cycles of local search, perturbation, and solution acceptance. At each iteration, the current solution is intensified using local search operators, followed by a diversification phase designed to escape local optima. The adaptive mechanism of the algorithm dynamically adjusts the search behavior during execution, seeking a balance between exploration and intensification.

Parameter Configuration via Command Line

A key feature of our C implementation of AILS-II is the ability to modify all major algorithm parameters directly via the command line. This design choice significantly enhances experimental flexibility, allowing multiple configurations to be tested without the need to recompile the source code.

Examples of parameters that can be configured through command-line arguments include stopping criteria, perturbation intensities, iteration limits, and weights associated with local search operators. This approach facilitates systematic sensitivity analyses, parameter calibration, and seamless integration with automated experimentation scripts and high-performance computing environments.

As a result, the AILS-II algorithm rewritten in C not only maintains the solution quality of the original version, but also provides improved efficiency, greater experimental control, and enhanced reproducibility, making it particularly suitable for academic research and large-scale optimization studies.