

# A hybrid Ant-Wolf Algorithm to optimize assembly sequence planning problem

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## Abstract

**Purpose** – This paper aims to optimize the assembly sequence planning (ASP) problem using a proposed hybrid algorithm based on Ant Colony Optimization (ACO) and Gray Wolf Optimizer (GWO). The proposed Hybrid Ant-Wolf Algorithm (HAWA) is designed to overcome premature convergence in ACO.

**Design/methodology/approach** – The ASP problem is formulated by using task-based representation. The HAWA adopts a global pheromone-updating procedure using the leadership hierarchy concept from the GWO into the ACO to enhance the algorithm performance. In GWO, three leaders are assigned to guide the search direction, instead of a single leader in most of the metaheuristic algorithms. Three assembly case studies used to test the algorithm performance.

**Findings** – The proposed HAWA performed better in comparison to the Genetic Algorithm, ACO and GWO because of the balance between exploration and exploitation. The best solution guides the search direction, while the neighboring solutions from leadership hierarchy concept avoid the algorithm trapped in a local optimum.

**Originality/value** – The originality of this research is on the proposed HAWA. In addition to the standard pheromone-updating procedure, a global pheromone-updating procedure is introduced, which adopted leadership hierarchy concept from GWO.

**Keywords** Ant Colony Optimization, Assembly sequence planning, Gray Wolf Optimizer

**Paper type** Research paper

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