

Binary Particle Swarm Optimization for Solving the Aircraft Routing Problem

Purpose (20-40 words)

The aircraft routing problem is to assign specific aircraft to scheduled flight legs. In this paper, the routing solution is heuristically optimized with respect to on-time performance by employing binary particle swarm optimization.

Research Design, methodology or approach (35-70 words)

The number of possible solutions to the aircraft routing problem increases exponentially as the given (sub)fleet and the number of flight legs to be operated increases. In this paper, the solution is heuristically improved by employing binary particle swarm optimization. For this purpose, a set of different initial routing solutions is derived from an operational schedule of an European airline and subject to stepwise alteration, correction and quality monitoring.

Expected findings (35-70 words)

Binary particle swarm optimization is like genetic algorithms a meta heuristic which imitates processes observable in nature. By this methodology we seek to improve the on-time performance of a given operational airline schedule. We expect to find a solution to the present aircraft routing problem that will be superior to the solution originally provided by the airline.

Contribution (35-70 words)

We assess the applicability of binary particle swarm optimization to the aircraft routing problem in general and, thereby, examine a relatively young solution approach. If applicability turns out to be given, our heuristic will complement the existing set of solution strategies and provide an alternative procedure to improve aircraft routing solutions significantly in a reasonable amount of computation time.

References (2-5)

Ben Ahmed, M., Mansour Zeghal, F., Haouari, M. A two-level optimization approach for robust aircraft routing and retiming [online]. *Computers & Industrial Engineering*, 2017, 112, 586-594. ISSN 0360-8352. Available at: <https://doi.org/10.1016/j.cie.2016.09.021>

Burke, E. K., De Causmaecker, P., De Maere, G., Mulder, J., Paelinck, M., Vanden Berghe, G. A multi-objective approach for robust airline scheduling [online]. *Computers & Operations Research*, 2009, ISSN 0305-0548. Available at: [dx.doi.org/10.1016/j.cor.2009.03.026](https://doi.org/10.1016/j.cor.2009.03.026)