

An Artificial Bee Colony Algorithm for the Vehicle Routing Problem with Backhauls and Time Windows

Naritsak Tuntitippawan and Krisada Asawarungsaengkul

Department of Industrial Engineering

King Mongkut's University of Technology North Bangkok

1518 Pracharat 1 Road, Wongsawang, Bangsue, Bangkok 10800, Thailand

nst@kmutnb.ac.th , krisadaa@kmutnb.ac.th

Abstract

This paper presents an artificial bee colony to solve the vehicle routing problem with backhauls and time windows (VRPBTW). This problem is a combination of the vehicle routing problem with backhauls (VRPB) and the vehicle routing problem with time windows (VRPTW). In VRPBTW, a fleet of vehicles are utilized to deliver goods to customers in linehaul set and then to pick up goods from customers or suppliers in backhaul set. This delivery and pick up procedure allows company to fully utilize the fleet of vehicles and leads to reduce fuel oil consumption. Backhaul and time windows are the major constraints for this problem. Moreover, each vehicle starts from a depot to deliver and pick up goods under the vehicle capacity constraint. The objective of VRPBTW is to minimize the total traveling distance that satisfies all constraints. The proposed artificial bee colony (ABC) algorithm is developed to solve the problem sets from modified Solomon's VRPTW benchmark problems. This ABC algorithm are tested with 25 and 50 customer nodes. The results of computational experiment reveal that ABC algorithm outperforms for 25 customer nodes and also yields us the good solutions for 50 customer nodes.

Keywords:

Artificial Bee Colony Algorithm, Vehicle Routing Problem, Backhauls and Time Windows.