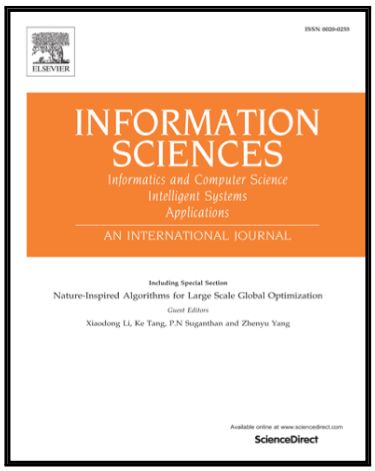

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An integrated multi-population genetic algorithm for multi-vehicle task assignment in a drift field☆

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Abstract

This paper investigates the task assignment problem for a team of autonomous aerial/marine vehicles driven by constant thrust and maneuvering in a planar lateral drift field. The aim is to minimize the total traveling time in order to guide the vehicles to deliver a number of customized sensors to a set of target points with different sensor demands in the drift field. To solve the problem, we consider together navigation strategies and target assignment algorithms; the former minimizes the traveling time between two given locations in the drift field and the latter allocates a sequence of target locations to each vehicle. We first consider the effect of the weight of the carried sensors on the speed of each vehicle, and construct a sufficient condition to guarantee that the whole operation environment is reachable for the vehicles. Then from optimal control principles, time-optimal path planning is carried out to navigate each vehicle from an initial position to its given target location. Most importantly, to assign the targets to the vehicles, we combine the virtual coding strategy, multiple offspring method, intermarriage crossover strategy, and the tabu search mechanism to obtain a co-evolutionary multi-population genetic algorithm, short-named CMGA. Sim-

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