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Multi-population parallel self-adaptive differential artificial bee colony algorithm with application in large-scale service composition for cloud manufacturing

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Graphical abstract

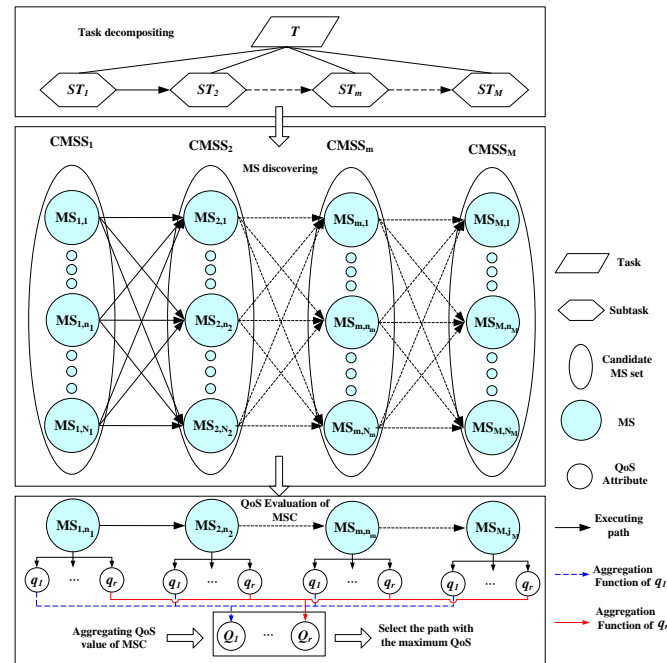


Fig.1. Process of manufacturing service composition

Highlights

Service composition and optimal selection has always been a core component in CMfg. For solving large-scale CCSOS problems, a hybrid so-called MPsaDABC algorithm, which integrates the respective advantages of DE and ABC with multi-population co-evolution strategy, is proposed in this study. The primary improvement strategies are summarized as follows:

(1) *Multiple dimensions of permutation* To overcome the drawback due to single variable perturbation in the basic ABC, the DE mutation strategies are introduced into the honey bee foraging behavior so that multiple dimensions of a candidate solution are perturbed each time, which helps to deal with the poor convergence rate of the basic ABC algorithm.

(2) *Ensemble of multiple strategies* Since different mutation strategies have distinct search behaviors and performance, and single strategy cannot perform well in the entire run of the algorithm, we divide the population into four subgroups, each of which evolves according to a certain modified mutation strategy, so as to improve the population diversity and search robustness of the proposed algorithm. Moreover, the control parameters of offspring individual generation

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