Multi-dimensional information-driven many-objective software remodularization approach

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Current Problem

- Moreover, most of the software remodularization approaches either consider limited dimensions of artefacts or give equal importance to each dimension of information in defining the objective functions
- However, it is commonly observed that the different dimensions of structural, lexical, and changed history information generally contribute differently in the software remodularization process instead they contribute equally
- The traditional multi-objective optimization algorithms work well with the optimization problems having a small number (less than three) of objective functions and do not work well with a large number of objective functions.

Original Ideas

- We introduce an improved definition of objective functions and many-objective metaheuristic optimization algorithm.
- Particularly, in the existing definition of software package coupling and cohesion, we incorporate the different dimensions of structural, lexical, and changed-history information and introduced different categories of coupling and cohesion metrics.
- This paper exploited more dimensions of software information to define the quality criteria as modularization objectives. Further, these objectives are simultaneously optimized using a tailored many-objective artificial bee colony (MaABC) to produce a remodularization solution.

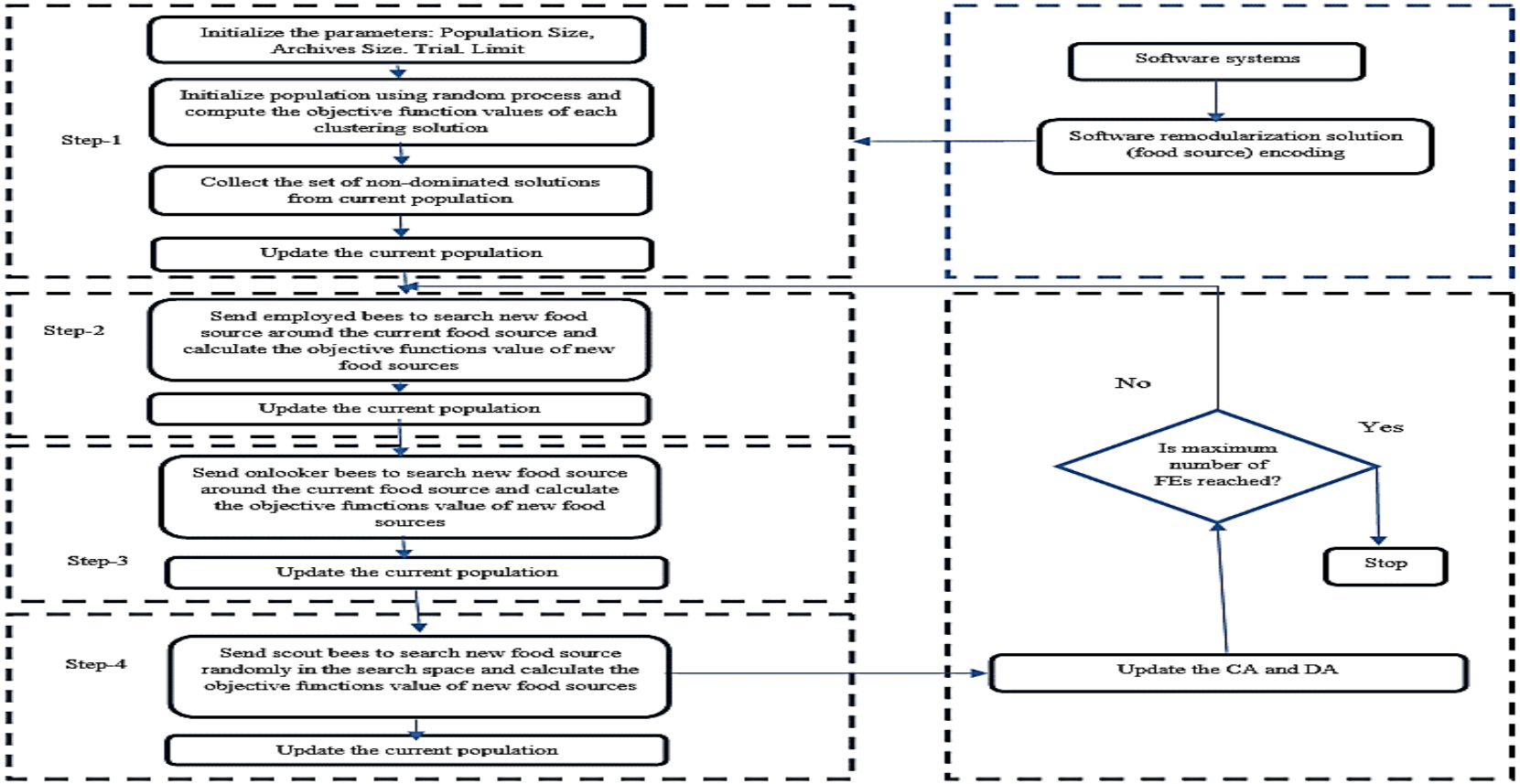

Fig. 3 Framework of the optimization process of the MaABC

In this paper, we introduced a multi-dimensional information-driven many-objective search-based software engineering approach for modularizing the software system. The approach aims at generating the remodularization solution that improves the software quality by optimizing the different version of coupling and cohesion measures such as structural-based coupling and cohesion, lexical-based coupling and cohesion, and changed-history-based coupling and cohesion. To optimize the different quality metrics to produce the remodularization solution, we used the MaABC algorithm, a many-objective search-based software engineering approach with some effective changes in selection strategies. Specifically, in this study, we addressed several issues of existing software remodularization approaches that are restricted to the use of particular types of structural or lexical information-based cohesion and coupling. We created multiple variants of many-objective SRPs using the different sets of objective functions in this continuation. An extensive experiment for remodularization of five object-oriented systems is performed to validate the supremacy of the proposed contributions. The obtained results show that the proposed contributions can generate a more effective remodularization solution than traditional SBSR approaches. In future work, the proposed work can be integrated with the IDEs and configuration management system to automate remodularization recommendation system