A Hybrid ACO Algorithm for Next Release Problem

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Jan. 7, 2010

Abstract

In this presentation, I'll introduce the Hybrid Ant Colony Optimization algorithm (HACO) for Next Release Problem (NRP) [1] in software requirement engineering.

Firstly, the NRP will be presented as a NP-hard problem. It aims to balance customer requests, resource constraints, and requirement dependencies by requirement selection. Then, the Ant Colony Optimization algorithm (ACO) [2] will be described in detail. The process of our algorithm HACO will be explained next, including how the artificial ants employ both pheromone trails and neighborhood information to determine the initial solutions, how the local search operator First-found Hill Climbing (FHC) is incorporated into HACO to improve solution quality, and how the automatic tuning procedure CALIBRA [3] effectively determines the interrelated parameter settings of ACO.

Finally, I'll show the experimental results of HACO on typical NRP test instances. It illustrates that HACO outperforms the existing algorithms (GRASP and simulated annealing) in terms of both solution quality and running time.

References

[1] A. J. Bagnall, V. J. Rayward-Smith and I. M. Whittley, "The Next Release Problem," Information and Software Technology, vol. 43, pp. 883-890, 2001.

[2] M. Dorigo and T. Stützle, Ant Colony Optimization (Book style). The MIT Press, London, 2004.

[3] B. Adenso-Diaz, M. Laguna, "Fine-tuning of algorithms using fractional experimental design and local search," Operations Research, pp. 99-114, 2006.