

研究、探讨

## 快速提高NSGA-II算法双目标优化效率的方法

刘敏<sup>1</sup>, 陈宝兴<sup>1</sup>, 郑金华<sup>2</sup>

1.漳州师范学院 计算机科学与工程系, 福建 漳州 363000

2.湘潭大学 信息工程学院, 湖南 湘潭 411105

收稿日期 2008-7-8 修回日期 2009-1-8 网络版发布日期 2009-12-6 接受日期

**摘要** NSGA-II是一种性能优良的多目标进化算法, 近年来非常流行。为了进一步改进NSGA-II在双目标优化时的效率, 采取了按需分层的策略, 提出了一种新的非支配前沿集分层方法以替代NSGA-II原有的分层方法。与NSGA-II的时间复杂度 $O(N^2)$ 相比, 新方法的时间复杂度减少为 $O(kN + N \log N)$ ,  $k$ 为所分前沿层数 ( $k \ll N$ )。实验结果也表明, 新方法与NSGA-II相比具有更少的非支配前沿层数, 支配比较次数和运行时间。

**关键词** [多目标进化](#) [非支配前沿](#) [按需分层](#)

**分类号** [TP18](#)

## Approach to improve bi-objective optimization efficiency of NSGA-II

LIU Min<sup>1</sup>, CHEN Bao-xing<sup>1</sup>, ZHENG Jin-hua<sup>2</sup>

1.Department of Computer Science and Engineering, Zhangzhou Normal College, Zhangzhou, Fujian 363000, China

2.Institute of Information Engineering, Xiangtan University, Xiangtan, Hunan 411105, China

### Abstract

NSGA-II is a multi-objective evolutionary algorithm, and its performance is so good that it has become very popular in the last few years. To improve its bi-objective optimization efficiency, in this paper, a layering strategy according to need is adopted and so a new algorithm to construct the set of non-dominated fronts is proposed to replace the original method of NSGA-II. Compared with the NSGA-II's computational complexity ( $O(N^2)$ ), the new algorithm's computational complexity is reduced to  $O(kN + N \log N)$ ,  $k$  is the number of fronts, and  $k \ll N$ . The experiment results also show that there are fewer layers of non-dominated fronts, counts of dominate compare and much less running-time in the new approach compared with NSGA-II.

**Key words** [multi-objective evolution](#) [non-dominated front](#) [layering strategy according to need](#)

DOI: 10.3778/j.issn.1002-8331.2009.34.015

通讯作者 刘敏 [liumin\\_xt@163.com](mailto:liumin_xt@163.com)

扩展功能	
本文信息	
▶ <a href="#">Supporting info</a>	
▶ <a href="#">PDF(557KB)</a>	
▶ <a href="#">[HTML全文](0KB)</a>	
▶ <a href="#">参考文献</a>	
服务与反馈	
▶ <a href="#">把本文推荐给朋友</a>	
▶ <a href="#">加入我的书架</a>	
▶ <a href="#">加入引用管理器</a>	
▶ <a href="#">复制索引</a>	
▶ <a href="#">Email Alert</a>	
▶ <a href="#">文章反馈</a>	
▶ <a href="#">浏览反馈信息</a>	
相关信息	
▶ <a href="#">本刊中 包含“多目标进化”的相关文章</a>	
▶ <a href="#">本文作者相关文章</a>	
· <a href="#">刘敏</a>	
· <a href="#">陈宝兴</a>	
· <a href="#">郑金华</a>	