

## 研究论文

### 分解多目标优化揭示复杂网络社区层次结构

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摘要:

提出了一种求解复杂网络社区检测的新算法. 新算法将社区检测问题构造为多目标优化问题, 通过在多个目标之间权衡折中, 实现在更广泛的空间进行社区结构检测, 克服了传统单目标优化存在解单一的缺陷. 算法采用MOEA/D框架, 运用Tchebycheff分解技术, 引入基于加权法的模拟退火局部搜索算子, 扩大了搜索范围, 使算法不易陷入局部最优解. 最后, 在计算机生成的网络数据集以及真实网络数据集上对算法进行了仿真实验. 结果表明, 该算法与已有算法相比, 具有较高的检测正确率, 计算量较小. 同时, 获得的多个Pareto最优解有助于揭示复杂网络社区的层次结构.

关键词: 复杂网络 社区检测 多目标优化 层次结构

### Revealing of the hierarchy community of the complex network by decomposition multi-objective optimization

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Abstract:

A new algorithm for community detection of complex networks is proposed. The problem of community detection is considered as multi-objective optimization problem. Tradeoff among multi-objectives realizes the detection of the community structure in a wider spread space, the disadvantages of the traditional single optimization algorithm is overcome. The MOEA/D framework is adopted and the Tchebycheff decomposition technique is used. A simulated annealing based weighted-sum method is used to perform local search which can expand the search scope, and not easily fall into local optimal solution. Finally, simulation experiments are done to test the algorithm using artificial and reality networks. The results show that, compared with existing algorithms, the algorithm has a higher detection accuracy and a small amount of computation, and can reveal the hierarchy community structure of the complex network by Pareto optimal solutions.

Keywords: complex networks community detection multi objective optimization hierarchy structure

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