

Referee report concerning the paper algorithms-2903236-peer-review-v1

The paper presents an approach to community detection in complex networks by simultaneously incorporating a connectivity-based metric and Max-Min Modularity. Leveraging the connectivity-based metric as well as employing a heuristic algorithm, the author establish a novel complementary graph for the Max-Min Modularity, enhancing the Max-Min Modularity's effectiveness. Then the community detection is formulated as an integer programming problem of a counterpart model of the revised Max-Min Modularity maximization problem. Utilizing a row generation technique and the heuristic approach, a hybrid procedure is provided for near-optimally solving the model and discovering high-quality communities. Finally, the algorithm's efficiency has been shown through experiments, particularly in extensive networks.

As mentioned above, the algorithm in this manuscript is efficient and the communities it found are of high quality. According to the experiments in this paper, new algorithm achieves great improvement compared with reference [15] and [16]. However, there are some places can't explain themselves in this article. Firstly, in lemma 1, the author seems to mix the size of P_α with the complexity of choosing P_α and forget to consider the time needed for computing the distance between nodes. When evaluate time efficiency in following theorem, this kind of time isn't taken into consideration either. Secondly, in my opinion, 'Lemma 2' and 'Theorem 4' can't be describe as lemma or theorem, and their proofs are not serious from mathematical view. Consequently, the optimal solutions of IPs-MM and IP-RMM are not equivalent but approximate. Thirdly, the transform from IP-RMM to IPs-MM seems too abbreviated to understand, for example, why y_{ijk} should be introduced?

As for recommendation, firstly, why not introduce more mathematical background in this paper instead of repeating same meaning in different words. Secondly, maybe there is a better metric in heuristic algorithm than q_G^C , and maybe there is a better heuristic algorithm to establish the complementary graph for Max-Min Modularity.

Remarks about details.

1. On page 5, 3 lines in Algorithm 1, ' v_1 ' should be ' p_1 '.
2. On page 10, Definition 5, ' $\{i, j\} \notin \bigcup_{i=1}^l C_i$ ' should be ' $\{i, j\} \notin C_i, i = 1, 2, \dots, l$ '.
3. On page 14, equation (17) leaks absolute value sign.
4. When clicking the reference, it won't jump to corresponding page.