Journal of Computer Science and Technology

Completed Review

Reviewer 2:

Reviewer Affiliation	The University of British Columbia, Dept. of Computer Science
Manuscript ID:	
Manuscript Type:	Original Article
Keywords:	Balanced Influence Maximization , Reverse Influence Sampling , Social Networks
Speciality:	Social Networks Analysis , Big Data Processing and Mining
Date Submitted:	*blinded*
Manuscript Title:	
Date Assigned:	10-Dec-2021
Date Review Returned:	11-Jan-2022

req **Would you be willing to be recommended to other journal(s) of this field as a reviewer?**

Overview Report	**Outstanding**	**Good**	**Fair**	**Poor**	**Very Poor**
Content					
req Is the work relevant?		✓			
req Is the work original?			✓		
req Are the methods/proofs/experiments/etc. sound and convincing?				✓	
Presentation					
req Is the abstract an adequate summary of the work?			✓		
req Are the background and related work(s) clearly introduced?			✓		
req Are the methods/proofs/experiments/etc. properly stated?				✓	
req Are the conclusions clear and adequate?			✓		
req Are the references adequate?			✓		

req Is the presentation clear to the relevant audience? ✓

req Are the overall organization and length of the manuscript adequate? ✓

req Is the English satisfactory? ✓

Summary Report

req **Quality**

Not significant

Priority of Publication

If accepted, should the manuscript be prioritized for publication? No

Accepted as

req **Confidence of your evaluation**

5(Absolutely Confident)

req **Recommendation**

- Accept without revision
- Accept with minor revision
- Review again after major revision
- Resubmit after major revision
- Submit to another journal
- ✓ Reject

req **Would you be willing to review a revision of this manuscript?**

- ✓ Yes
- No

Comments

Confidential Comments to the Editor

Comments to the Author

The paper studies the problem of balanced influence maximization where a trade-off between classic IM and group-wise influence is aimed. As an extension to their earlier conference work, authors allow group attributes to be overlapping. Under which the objective is shown to be non-monotone and non-submodular. Yet, the authors develop an efficient seed selection algorithm using RR sets, called ABRIS-G. ABRIS-T further improves the quality of the seeds by deploying a two-phased seed selection process. Experiments conducted, demonstrate the superiority of the proposed algorithms in terms of seed quality. The paper, however, has several drawbacks as listed below, and because of these, I recommend a reject decision.
(1) The presentation of the paper needs significant improvements. There are several typos, incorrect use of grammar throughout the paper. E.g., in the abstract "problem to concern the trade-off between", should be problem concerning.., in intro page 3 line 23 "and it has the capacity" should be and they have.., line 29 ". they surely" should be . They, Page 5 Line 29 "In each subsequence round" should be in each subsequent round, Page 7 Line 40 "guaranteed approximate ratio." should be approximation ratio and so on. Please do a thorough proofread to fix these issues.
(2) The presentation also has other issues - the motivation and justifications are inadequate. E.g., in the introduction, an important challenge for the BIM problem is stated to be "efficient scheduling strategy", which ABRIS-G is supposed to use. However, the description of ABRIS-G does not specify what the schedule is, in fact in pseudo-code Algorithm 2, there is no schedule used. Similarly, there are two other misleading claims made in the introduction - (a) It is claimed "We formulate the balanced infuence maximization problem, which is novel", which needs to be toned down as papers [27,28] study a very similar problem as mentioned later in the Related work section. Although their solutions do not scale. (b) It is also mentioned that "mechanism with theoretical guarantee to select seed nodes to achieve balanced infuence" is achieved. However, it is not clear from the analysis if this is indeed achieved. More on this in the next point.
(3) The theoretical analysis is incomplete and as a result difficult to follow. It also contains some unreasonable claims, unless all the details are provided accurately, it is difficult to validate those claims as a reviewer. In particular, it is shown that the objective is non-monotone and non-submodular, and yet a greedy hill-climbing algorithm is used for the seed selection. It is not clear, why for a non-monotone function, such a greedy selection would be reasonable. In particular, in the proof of Theorem 4.6, it is claimed that the greedy seeds achieve a (1-1/e)-approximation w.r.t. the optimal seeds. Clearly, for a non-monotone function, this is not true, so it begs the question if, in a specific group, the spread is monotone and sub-modular. Only then such a claim would be true, although it is not shown. Further, it is also not clear how this guarantee translates to the overall objective of ABRIS-G/T. Without this translation, it is not clear how a theoretical guarantee for the BIM problem is achieved as claimed in the earlier introduction.
(4) The disparity index used in the objective is also different from the group-wise ratio motivated in the introduction. The disparity ratio only looks at two groups, while ignoring the others. E.g., consider groups with the following the number of nodes {4,4,4,1}. Let S1 influence be {2,2,1,1} and S2 be {3,1,1,1}. According to the proposed disparity index, S1 and S2 have the same disparity, however, it is clear S1 achieves a better balance. There should be adequate justification and right claims.
(5) It is quite surprising that for a paper where the primary contribution is in terms of designing efficient solutions, there is no scalability study. Also, TIM is dated in terms of efficiency, please compare it against more recent and efficient alternatives such as IMM.
(6) All the experiments are conducted using static edge weights for the graphs. Authors should consider some alternatives such as 1/indegree, trivalency, etc. Also repeating 10 times is too small, consider increasing it to at least 1000.
(7) Accuracy criterion and proportionality factor are undefined in Theorem 4.4.

Reviewer opted in to receive recognition on Publons? (Yes/No answer required)

✓ Yes

No

Use the below rating options to rate the reviewer on <u>this</u> submitted review. The rating options have corresponding numerical values which are averaged to determine an "R-Score" for reviewers. The "R-Score" for a reviewer displays as part of the reviewer search results to give you an indication of past performance.