REVISION SUMMARY

We are grateful to receive your constructive and valuable comments, which have helped us improve the overall quality of the paper.

In this revision, we have made significant changes according to the suggestions:

- We revise our contributions to state them more clearly.
- We interpret d_{sum} when it is first mentioned in line 75, explain the reason why we add "(k=0)" and "(k=1)" after "P-FGA" and "P-NETTACK" in line 300 and bold the value in the 5th row and 2nd column of Table 4, so as to achieve better presentation and understanding.
- We add more discussion about the drawbacks of our proposed method in Related Works, including computational inefficiency and not considering more constraints of attributed graphs.
- We add 9 new references from the past two years.
- Efforts were also made to correct the typos and improve the English of the manuscript.

The following are our point-to-point responses to the reviewers' comments.

Reviewer #1

✓ 1. *Bold the data in the 5th row and 2nd column of Table 4 (i.e., 1).*

Our Response: Thank you for pointing out this mistake, this number is bold in the revision.

✓ 2. *I would expect more elaboration on the contributions.*

Our Response: Thank you for your suggestion. In the revision, we add more elaboration on the contributions. The revised part in Page 3 of Section Introduction is shown as follows:

"We summarize our contributions as follows:

- We give the very first attempt to propose a multi-node parallel adversarial attack framework on node classification in socialnet of graph structure, based on considering perturbation influence between per-node attacks.

- Node filtering-based non-constraint P-FGA and node filtering-based constraint P-NETTACK are proposed, and we integrate them into a unified multi-node parallel attack framework, through constructing intersection and supplement mechanisms of perturbation.

- We evaluate our approach empirically on real dataset of politician socialnet Polblogs. Based on parallel attacking on the graph of 1222 nodes and 16714 edges, we reveal and verify effectiveness of our approach compared to sequential attacks in terms of attack strength and attack stealthiness."

✓ 3. *It would be more reader-friendly to explain why you add "(k=0)" and "(k=1)" after "P-FGA" and "P-NETTACK" respectively in Table 3 and Table 5.*

Our Response: Thank you for your suggestions. We add the following explanation in line 300 of Page 12.

"From Algorithm 4, we know that if k=1, our unified method can be simplified as P-NETTACK; and if k=0, our unified method can be simplified as P-FGA."

✓ 4. *It is better to add more discussion about your proposed method in Related Works, especially its drawbacks.*

Our Response: Thank you for your suggestions. We add the following discussion about the drawbacks of our method in Related Works.

"In addition to the benefits mentioned above, the main drawback of our method is that it is time-consuming, especially the P-NETTACK (see Table 7), due to the reason that at each iteration, more candidate perturbations are taken into computation compared with sequential per-node attack. One of the solutions is developing more computationally efficient test statistic function and scoring function. On the other hand, proposing a perturbation filtering mechanism to reduce the size of multi-node candidate perturbations set is also an effective way. In addition, our method does not consider the constraints of attributed graphs [33], such as attribution-based node similarity constraint [34] and attribution co-occurrence constraint [17]. Parallel multi-node adversarial attack on attributed graph and Heterogeneous Information Network (HIN) [35] still needs further exploration."

✓ 5. *If possible, please add references from the past two years.*

Our Response: Many thanks to your suggestions. In this version, we add 9 new references in the past two years.

- [3] Branitskiy A, Levshun D, Krasilnikova N, et al. Determination of Young Generation's Sensitivity to the Destructive Stimuli based on the Information in Social Networks[J]. J. Internet Serv. Inf. Secur., 2019, 9(3): 1-20.

- [5] Kolomeets M, Benachour A, El Baz D, et al. Reference architecture for social networks graph analysis tool[J]. Journal of Wireless Mobile Networks, Ubiquitous Computing, and Dependable Applications, 2019, 10(4): 109-125.
- [6] Kolomeets M, Chechulin A, Kotenko I V. Social networks analysis by graph algorithms on the example of the VKontakte social network[J]. J. Wirel. Mob. Networks Ubiquitous Comput. Dependable Appl., 2019, 10(2): 55-75.
- [11] Zhang S, Tong H, Xu J, et al. Graph convolutional networks: a comprehensive review[J]. Computational Social Networks, 2019, 6(1): 11.
- [13] Wu Z, Pan S, Chen F, et al. A comprehensive survey on graph neural networks[J]. IEEE Transactions on Neural Networks and Learning Systems, 2020.
- [14] Zügner D, Günnemann S. Certifiable robustness of graph convolutional networks under structure perturbations[C]//Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining. 2020: 1656-1665.
- [33] Cui G, Zhou J, Yang C, et al. Adaptive Graph Encoder for Attributed Graph Embedding[C]//Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining. 2020: 976-985.
- [34] Wu H, Wang C, Tyshetskiy Y, et al. Adversarial examples on graph data: Deep insights into attack and defense[J]. arXiv preprint arXiv:1903.01610, 2019.
- [35] Lu Y, Fang Y, Shi C. Meta-learning on heterogeneous information networks for cold-start recommendation[C]//Proceedings of the 26th ACM SIGKDD International Conference on Knowledge Discovery & Data Mining. 2020: 1563-1573.

✓ 6. *The overall English is good but a thorough proofreading by a native speaker is still highly recommended.*

Our Response: Many thanks to your suggestions. Efforts were made to correct the typos and make careful proofreading again. We believe that the English presentation of current version has been well improved.

Reviewer #2

✓ 1. *Please interpret d_{sum} when it is first mentioned in line 75.*

Our Response: Thanks for your suggestion. We add the following explanation in line 75.

"(d_{sum} is the sum of the degrees of all target nodes)"

✓ 2. *This paper needs careful proofreading. There are many minor English issues. I list several of them here. - change all occurrences of "matrixes" to "matrices".*

- Line 31, "Tiktok"–>"TikTok". - Line 60, "an global attack success rate of 2/3" –> "a global attack success rate of 2/3". - Line 76, "a satisfied test statistics" –> "a satisfied test statistic". - Line 184, "and meanwhile are connected/disconnected" –> "and meanwhile is connected/disconnected". - Line 204, "a node have to be considered" –> "a node has to be considered". - Line 288, ", which measure the structure difference" –> ", which measures the structural difference".

Our Response: Many thanks for pointing out these English errors. In this revision, we try to make careful proofreading again and have corrected all the mistakes you suggested. Some other grammar mistakes are also found and corrected. We believe that the English presentation of current version has been well improved. The detailed revisions are listed as follows.

- We change all the terms "matrixes" to "matrices".
- In line 31, we change "Tiktok" to "TikTok".
- In line 60, "an global attack success rate of 2/3" is changed to "a global attack success rate of 2/3".
- "a satisfied test statistics" is changed to "a satisfied test statistic" in line 77.
- We change "important structure characteristics" to "important structural characteristics" in line 150.
- We change "D_{P-FGA} and $D_{P-NETTACK}$ are perturbation set" to "D_{P-FGA} and $D_{P-NETTACK}$ are perturbation sets" in line 160.
- We change "and meanwhile are connected/disconnected" to "and meanwhile is connected/disconnected" in line 186.
- "Thus we design the Equation 9" is changed to "Thus, we design the Equation 9" in line 188.
- In line 205, "a node have to be considered" is changed to "a node has to be considered".
- ", which measure the structure difference" is changed to ", which measures the structural difference" in line 289.
- We change "from the test set that have been classified correctly" to "from the test set that has been classified correctly" in line 295.