Response to Reviewer2 Comments

We are very grateful to your favorite consideration and insightful comments for our manuscript # information-603513 entitled “Identifying Influential Nodes in Complex Networks based on Local Effective Distance”. Your comments and suggestions are very important and have important guiding significance for our writing and research. According to your advice, we have put great efforts to amend the relevant part in the manuscript. All responses and corrections of the manuscript have been made in red font. We wish it can be satisfactory. Some of your questions were answered below.

**Point 1**: The introduction should highlight the organization of the rest of the document.

**Response 1**: Thank you for your constructive comments. We have realized that clear organization descriptions allow readers to read manuscripts more efficiently. Based on your comments, we have added the corresponding sentence about the organization of documents.

The rest of this article is organized as follows. Section 2 introduces the classical methods of influence node detection in complex networks, and introduces the advantages and disadvantages of various algorithms according to classification. Section 3 introduces the design principle of KDEC ranking algorithm proposed in this paper, and introduces the calculation process of the KDEC model in combination with a simple network. Section 4 verifies the effectiveness of the proposed method by experimental comparison with the classical algorithm and the recently proposed profitleader algorithm. The Section 5 is the conclusion. (Introduction, line62)

**Point 2**: A Section indicating the research design principles should be included, among them detailing its: primarily/secondary objectives, null/alternative hypothesis, assumptions, limitations, etc.

**Response 2**: Thank you very much for reading our manuscript for details and suggested manuscript. The design principles and assumptions of the algorithm allow the reader to gain a deeper understanding of the performance of the proposed algorithm. According to your suggestion, we made the following changes in the manuscript:

In section 1, the main contributions of the KDEC algorithm are added to illustrate the advantages of our proposed algorithm and the applicable network.

The main contributions of this work are, (1) Accurate influential node detection: The KDEC method comprehensively considers a variety of attributes to sort the nodes, which can detect the influential nodes more effectively and the sorting results are more accurate; (2) Parameter free: KDEC dose not rely on prior knowledge and parameter adjustments but can automatically identify influential nodes; (3) Scalability: KDEC uses two-stage neighbors of nodes to identify affected nodes, which greatly reduces the calculation cost. and has no strict requirements on the global topology of the network. Therefore, it is suitable for connected or disconnected networks. (Introduction, line55)
In section 3, we introduce the design idea of our algorithm in view of the advantages and disadvantages of the existing sorting algorithm mentioned in section 2. (The KDEC Model)

At present, many scholars have proposed various influential node detection methods from different perspectives, each with its own advantages and disadvantages. The influence of a node in a complex network mainly depends on three aspects: The first is the location of the node in the network. While the node is in the center of the network, the impact will be significant. Else, if the node is at the edge of the network, the impact will certainly be relatively small. The second is the number of neighbors around the node. The more nodes that can be affected in the local scope, the greater the influence of the nodes. The third is the ability of nodes to influence their neighbors. The smaller the distance between the node and the neighboring node, the greater the probability that the node transmits information to the neighboring node, and the greater the probability that the neighboring node is affected. On this basis, this paper proposes the KDEC method. As described in section 1, the KDEC algorithm has the advantages of accurate impact node detection, parameter freedom, and scalability. Compared with most existing algorithms, our algorithm performs well on various networks. (The KDEC Model, line 115)

Point 3: Some figures (e.g. Figure f) are very small, so they are difficult to read.

Response 3: Thank you very much for your careful reading and Suggestions. In this paper, when comparing the infection effect of different sorting results of algorithms, there are many comparison graphs involving algorithm performance. If the small graph is split, it will take up too much space. And it is not easy to visually see the comparison of algorithm performance. According to your suggestion, we have carefully checked the quality of the pictures in the original manuscript. In addition, we have modified the font size in the figures and the sub-graphs were tagged to make them look clearer. Such as:

(a) Arenas-email  (b) Friendship  (c) Web-spam

Figure 2. Infection effect of influential nodes identified by each comparison algorithm.
Figure 3. Propagation effects of the top-10 different nodes of KDEC and other comparison algorithms.

**Point 4:** The section Conclusions should indicate some of the most outstanding aspects not covered by the submission, that may be taken into consideration for future work.

**Response 4:** Thank you for your constructive comments. We have realized that we should add some content about the future work in the conclusion. As your suggestion, a description of future work has been added in the conclusion.

In this paper, we change the traditional method of distance evaluation between nodes, conduct in-depth research on the effective distance between nodes, and comprehensively evaluate the influence ability of nodes in the network by combining the position attribute of nodes in the network and the interaction force on neighboring nodes. In order to verify the effectiveness of this ranking method, we selected six real networks with different network structure attributes, and carried out experimental verification from three aspects, namely, node infection capacity, transmission effectiveness, and consistency with the results of standard SIR model. From the experimental results, the proposed KDEC method has obvious advantages over the classical sorting method and the recently proposed profitleader ranking method in node importance sorting. But our method selected node degree value and K_core as initial weights of nodes, the product of this in the computing time complexity is a little high, and in this article, when considering the influence of the neighbor nodes, we only got the second order neighbors. The node importance evaluation accuracy needs to be improved, they are the next steps we need to take to improve the proposed algorithm. (Conclusion, line 321)

Thank you again for your insightful comments, and we hope that the response can be accepted by the reviewer. If you have any further questions about this paper, please don’t hesitate to let me know.