**Response to the Reviewers’ Comments on Paper “PR-D-07-00763R1”**

We would like to thank the editor and anonymous referees for their useful comments and suggestions. We have tried our best to revise the paper according to these comments and suggestions.

**Editor's comments:**

**EiC: While you are revising your paper, here is a list of points worth checking, which we find author's overlook. I will check that these are adhered to before your paper is approved for publication, assuming the revision satisfies the Associate Editor and Reviewers.**

**a) Make sure your title is succinct and grammatical. It should ideally not exceed 10-15 words.**

**b) Make sure your conclusions reflect on the strengths and weaknesses of your work, how others in the field can benefit from it and thoroughly discus future work. The conclusions should be different in content from the abstract, and be rather longer too.**

**c) Take a careful look at your bibliography and how you cite papers listed in it. Make sure it is current, and cites recent work. Please cite a variety of different sources of literature. Please do not make excessive citation to arXiv papers, or papers from a single conference series. Do not cite large groups of papers without individually commenting on them. So we discourage " In prior work [1,2,3,4,5,6] …". Your bibliography should only exceptionally exceed about 40 items.**

**d) You may have originally written your paper with a different audience in mind. Please make sure the revised version is relevant to the readership of Pattern Recognition. To this end please make sure you cite RECENT work from the field of pattern recognition that will be relevant to our readership.**

**e) Do not exceed the page limits or violate the format, i.e. double spaced SINGLE column with a maximum of 35 pages for a regular paper and 40 pages for a review.**

Thank you for your kind advice, we had checked our paper and corrected the problems you mentioned.

Reviewer #3:

**The authors addressed adeqiately the reviewers' comments. However, there are some issues that in the reference section should be fixed.**

**Specifically:**

1. **Reference 29, Reference 32 (Is it possible to replace it with any published, and peer-reviewed paper ?), Reference 40 (please, check it).**

The references have been checked and corrected according to this recommendation.

1. **In the dataset sections, for any dataset ( MNIST) the reference is reported, for others (ORL, UMIST, C-Cube) the reference is not reported. Please add it for them.**

The references were added in the paper.

**Reviewer #4: The paper introduces some improvements to low-rank representation learning. The proposed approach is interesting, however the paper still requires major changes.**

1. **The language is rather poor - there are grammatical and stylistic mistakes, as well as typos, which overall make the text difficult to read and result in some ambiguities. Overall, the text must be thoroughly revised. Just a single example: "That is due to in these datasets, NSLLRR learns too sparse matrix Z and makes Semi-supervised algorithm get worse accuracy. LRR is the most classical LRR-based algorithm, and its result may better than NSLLRR and LRRADP." This is really hard to read and it is representative for the entire paper.**

The language has been checked and corrected.

1. **The contribution stated in the introduction is not convincing. There are many manifold learning methods - do the authors claim that all of them ignore higher-order neighborhood?**

In the contribution, we want to explain that many LRR methods use k-nearest neighbors as the constraint and they may miss some useful information. To avoid this misleading, the sentence has been rewritten as " Most of the modified LRR methods mentioned above use $k$-nearest neighbors to improve the performance. However, the number of neighbors $k$ affects the performance of the algorithm obviously and $k$ nearest neighbors may bring bad effect for representation [21]. "

[21] J. Wen, B. Zhang, Y. Xu, J. Yang, N. Han, Adaptive weighted nonnegative low-rank representation, Pattern Recognit. 81 (2018) 326–340.

1. **Deep learning has been used for learning low-rank representation, and possibly this may solve the shortcomings identified by the authors in a more effective way. Some comparisons would be necessary. See for example:**

**Zhang, Mingjin, et al. "Deep latent low-rank representation for face sketch synthesis." IEEE transactions on neural networks and learning systems 30.10 (2019): 3109-3123.**

Yes, deep learning is an effective way to improve the performance of the low-rank representation. And we have added this kind of algorithm in our paper.

However, traditional methods which don’t use the deep learning, always perform worse than the deep methods. The deep methods usually are unions of many technics (e.g. feature selection, feature representation) with huge quantity parameters to learn. This also leads to the large computational amount. The traditional methods usually use handcraft features with lower computation cost and have better interpretability. Both deep and traditional methods have their advantages and applications.

1. **In my opinion, the term "high hierarchy nearest neighbor" is not appropriate - do you mean "second-order neighborhood" here?**

As defined in our paper, for a given data ***x****i*,the neighbors of the *n*-th neighbors’ are the *n*+1 order neighbors of ***x****i*. We use all the high order neighbors of the data point (e.g. third-order, fourth-order neighbor). And the Fig.5 shows all the points can be found including first to third hierarchy neighbors.

1. **The experimental validation is insufficient. First, only one metric for clustering and classification is reported (accuracy and NMI), which may bias the conclusions. More metrics must be quoted (e.g., F-score, AUC, kappa coefficient, Rand index, etc.). Second, statistical tests should be performed to verify the significance of the differences between the methods. Also, time performance has not been reported at all. Overall, from the reported results, it is impossible to conclude whether the proposed method really improves the state of the art.**

We have redesigned the experiment according to this recommendation. More metrics (the F-score, adjusted rand index and recall) were added in the experiments. In order to verify the significance of the differences, the mean and standard deviation of all metrics were given. Moreover, the time cost of all algorithms were added.

1. **Explain the meaning of the table columns in the table captions.**

The meaning of table columns has been added according to this recommendation.

1. **Improve formatting of the references (there are some question marks there...).**

The references have been checked and corrected.

1. **The abbreviation used as the name of the algorithm (LRRHWAP) is too long to remember or pronounce - consider changing it.**

The name of our algorithm has been changed as hierarchy weighted low rank representation (HWLRR).

1. **In the conclusions, it is stated that "a novel low rank representation with hierarchy weighted afinity propagation (LRRHWAP) is proposed to capture the relationship among data points" - this suggests that other methods do not capture the relationship between the data points which is not true.**

This sentence has been rewritten as “In this paper, a novel hierarchy weighted low rank representation (HWLRR) is proposed to capture the high hierarchy relationship among data points using the hierarchy weight.”