

Paper:TIP-19273-2018, "Simplex Representation for Subspace Clustering"

Dear Prof. Lei Zhang,

I am writing to you concerning the above referenced manuscript, which you submitted to the IEEE Transactions on Image Processing.

Based on the enclosed set of reviews, your manuscript requires a MAJOR REVISION (RQ). Please note that the reviewers raised a major concern about the novelty and innovation of the manuscript.

Your revised manuscript must be submitted back to ScholarOne Manuscripts <https://mc.manuscriptcentral.com/tip-ieee> no later than 6 weeks from the date of this letter together with a required point-by-point reply that explains how you addressed the reviewers' comments. If we do not receive your revised manuscript within 6 weeks from the date of this letter, your manuscript will be considered withdrawn.

After you finish revising your manuscript, please log into your Author Center at <https://mc.manuscriptcentral.com/tip-ieee> to upload the new file(s) to your submission. You will find your manuscript title listed under "Manuscripts with Decisions." Under "Actions," click on "Create a Revision."

When submitting your revised manuscript, please make sure to also upload your required "response-to-reviewers" file. You can upload this file in the section marked "Respond to the Decision Letter" or to the "File Upload" section. It must be uploaded as a separate file from your manuscript file. Please do NOT upload it to the "cover letter" field as the AE/reviewers do not have access to that section.

Please remember that the Associate Editor should only decide RQ (major revision) once during the peer review process of any paper. Subsequent decisions after one RQ should be AQ, A, or R only.

If you have any questions regarding the reviews, please contact me. Any other inquiries should be directed to Kathy Jackson.

NOTE – Open Access:

The publication is a hybrid journal, allowing either Traditional manuscript submission or Open Access (author-pays OA) manuscript submission. Upon submission of your final files, if you choose to have your manuscript be an Open Access article, you commit to pay the discounted OA fee if your manuscript is accepted for publication in order to enable unrestricted public access. As of 01 January 2017, the OA fee is \$1,950. Any other application charges (such as charge for the use of color in the print format) will be billed separately once the manuscript formatting is complete but prior to the publication. If you would like your manuscript to be a Traditional submission, your article will be available to qualified subscribers and purchasers via IEEE Xplore. No OA payment is required for Traditional submission.

NOTE – Overlength manuscripts:

The final submitted version of your manuscript may not exceed 16 pages in the double-column, single-spaced format including figures, photos, and bios. If your paper is accepted, it will not be sent to production if it exceeds this limit. Additionally, any manuscript that exceeds 10 pages in double-column format will be charged mandatory overlength fees. The rate is \$220/page starting on page 11 of a published manuscript.

NOTE- As of 01 Feb. 2018 the current accepted version of your manuscript will be made available on IEEE Xplore within 3 weeks after receipt of the final materials. This will be a preprinted version that will be later replaced by the fully edited version after you have submitted the revised proofs. Both preprinted and fully edited versions will have the same Digital Object Identifier (DOI), they will be equivalent as far as citations are concerned.

=====

Best regards,

Dr. Chun-Shien Lu
Associate Editor
IEEE Transactions on Image Processing
lcs@iis.sinica.edu.tw

Kathy Jackson

Reviewer Comments:

Reviewer: 1

Recommendation: RQ - Review Again After Major Changes

Comments:

This paper proposes an improved least squares regression model for subspace clustering. As the improvement just adds the non-negative coefficients constraint and the scaled affine constraint to the least squares regression model, I think its innovation is very small. In addition, I don't think the proposed non-negative coefficient representation is more discriminative than the common sparse representation. I understand that your affinity matrix construction method expects a non-negative coefficient representation, but I think it's more reasonable to study a better affinity matrix construction rather than constraining the coefficient to non-negative. Therefore, I think the paper needs major improvement.

More comments and suggestions:

1, Please address the novelty of the idea.

2, The authors argue that the non-negativity constraint can enhance the discriminativity of the coefficients. Why ? If so, can all sparse representation methods add the non-negative constraint to get a better result?

3, I can't judge whether the Section Discussion and Fig.1 are correct or not. They say x_1 can only be represented by itself in the case of affine constraint. In my opinion, this is not true when there are enough samples.

4, To the best of my knowledge, the state-of-the-art of subspace clustering method is Deep Subspace Clustering Networks (NIPS2017), but the author did not compare with it.

Additional Questions:

1. Is the topic appropriate for publication in these transactions?: Excellent Match

1. Is the paper technically sound?: No

2. How would you rate the technical novelty of the paper?: Somewhat Novel

3. Is the contribution significant?: Incremental

4. Is the coverage of the topic sufficiently comprehensive and balanced?: Yes

5. Rate the Bibliography: Satisfactory

1. How would you rate the overall organization of the paper?: Could be improved

2. Are the title and abstract satisfactory?: Yes

3. Is the length of the paper appropriate? If not, recommend what should be added or eliminated.: Yes

4. Are symbols, terms, and concepts adequately defined?: Yes

5. How do you rate the English usage?: Satisfactory

Reviewer: 2

Recommendation: RQ - Review Again After Major Changes

Comments:

(There are no comments. Please check to see if comments were included as a file attachment with this e-mail or as an attachment in your Author Center.)

Additional Questions:

1. Is the topic appropriate for publication in these transactions?: Adequate Match

1. Is the paper technically sound?: Yes

2. How would you rate the technical novelty of the paper?: Somewhat Novel
3. Is the contribution significant?: Incremental
4. Is the coverage of the topic sufficiently comprehensive and balanced?: Important Information is missing or superficially treated
5. Rate the Bibliography: Satisfactory
1. How would you rate the overall organization of the paper?: Satisfactory
2. Are the title and abstract satisfactory?: Yes
3. Is the length of the paper appropriate? If not, recommend what should be added or eliminated.: Yes
4. Are symbols, terms, and concepts adequately defined?: Yes
5. How do you rate the English usage?: Satisfactory

Reviewer: 3

Recommendation: RQ - Review Again After Major Changes

Comments:

The paper proposes a new type of constraints for finding the coefficients for subspace clustering algorithms. By enforcing the coefficients to be non-negative and summed to a pre-selected constant and allowing any sample to be represented by itself, the paper claims that simplex representation can deal with noise and outliers in the datasets more robustly than existing subspace clustering methods.

The proposed method is simple but effective. It demonstrates superior performance over existing subspace clustering methods. However, the contribution seems to be a bit thin to me. Since the main focus of the paper is the scaled simplex constraint, it would be nice to see some analysis and more thorough experiments on the simplex constraints. Even though Figure 1 provides some intuitions of the simplex constraint, the example seems a bit artificial and too simple. It would be nice to see what theoretical advantages the simplex representation has compared to existing methods.

In addition, I have the following questions.

1. For Table 2, 3, and 4, what are the s for the SLSRs, and are they fine-tuned for each problem?
2. From Figure 4, 6, and 8, it seems like the performance of the proposed method depends strongly on the choice of s . In an unsupervised setting, how can s be chosen?
3. What does it mean if $s > 1$? How does the proposed method work when $s > 1$?
4. Why does the datasets have very different s values?
4. It would be more informative if some quantitative metric can be added to Figure 2, instead of just showing affinity matrices in images.

All in all, I am not sure if the current status of the paper reaches the bar of TIP. If my questions are answered and all other reviewers support the paper, I am happy to change my score.

Additional Questions:

1. Is the topic appropriate for publication in these transactions?: Excellent Match
1. Is the paper technically sound?: Yes
2. How would you rate the technical novelty of the paper?: Somewhat Novel
3. Is the contribution significant?: Incremental
4. Is the coverage of the topic sufficiently comprehensive and balanced?: Treatment somewhat unbalanced, but not seriously so
5. Rate the Bibliography: Satisfactory
1. How would you rate the overall organization of the paper?: Satisfactory
2. Are the title and abstract satisfactory?: Yes
3. Is the length of the paper appropriate? If not, recommend what should be added or eliminated.: Yes
4. Are symbols, terms, and concepts adequately defined?: Yes
5. How do you rate the English usage?: Satisfactory