



Charles Garfinkle &lt;cjfinks@gmail.com&gt;

---

**((AQ)) T-SP-24496-2018 - IEEE Transactions on Signal Processing - "On the uniqueness and stability of dictionaries for sparse representation of noisy signals"**

---

**Transactions on Signal Processing** <onbehalf@manuscriptcentral.com>

Tue, Apr 2, 2019 at 4:48 AM

Reply-To: tronto@noa.gr

To: chillar@msri.org

Cc: cjfinks@gmail.com, chillar@msri.org, tronto@noa.gr

02-Apr-2019

Dr. Christopher Hillar  
University of California, Berkeley  
575A Evans Hall, MC 3198  
Berkeley  
California  
United States  
94720-3198

Paper:T-SP-24496-2018, "On the uniqueness and stability of dictionaries for sparse representation of noisy signals"

Dear Dr. Christopher Hillar,

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

Reviews on your work have now been received. The reviewers believe that the paper is novel and quite well-written and raise some minor issues that you should carefully address before the paper is finally accepted to IEEE TSP.

Based on the enclosed set of reviews, your manuscript requires MINOR REVISIONS before acceptance (AQ).

Your revised manuscript must be submitted back to ScholarOne Manuscripts <https://mc.manuscriptcentral.com/tsp-ieee> no later than 3 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do not receive your revised manuscript within 3 weeks from the date of this letter, your manuscript will be considered withdrawn.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/tsp-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.

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

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 - Changes after Acceptance:**

If your paper is accepted, your manuscript will be made available on IEEE Xplore within 3 weeks after receipt of the final materials. Please note that the version of your manuscript that was ACCEPTED for publication will be the version posted for early access. No changes will be allowed to be made to your accepted paper between when the "accept" decision is posted and you submit the final files.

=====

Best regards,

Dr. Athanasios Rontogiannis  
Associate Editor  
IEEE Transactions on Signal Processing  
[tronto@noa.gr](mailto:tronto@noa.gr)

Adrienne Fisher  
Coordinator Society Publications  
IEEE Signal Processing Society  
[a.r.fisher@ieee.org](mailto:a.r.fisher@ieee.org)

Reviewer Comments:

Reviewer: 1

Recommendation: AQ - Publish With Minor, Required Changes

Comments:  
See PDF

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?: Novel

3. Is the contribution significant?: Significant

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?: 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  
null:
4. Are symbols, terms, and concepts adequately defined?:
5. How do you rate the English usage?: Satisfactory

Reviewer: 2

Recommendation: A - Publish Unaltered

Comments:

This paper studies the conditions under which the dictionary learning problem is well-posed, under the assumption of additive noise. Overall I think it is nicely written.

I have some doubts about (1) efficiency of checking the assumption stated in theorem 1; (2) numerically solving the optimization problem as stated in eqn (4) in practice. I personally think rephrasing some of the graph theoretic terms will make the paper easier to follow, but that might just be personal preference.

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?: Moderately Significant
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?: 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  
null:
4. Are symbols, terms, and concepts adequately defined?: Yes
5. How do you rate the English usage?: Satisfactory

Reviewer: 3

Recommendation: AQ - Publish With Minor, Required Changes

## Comments:

This paper considers the uniqueness and stability of sparse dictionary learning problem. The paper is well written and organized. Although it is a pure theory paper, it is fairly easy to follow the key ideas without messing up with the proofs. Below are some more detailed comments:

1. This work considers the uniqueness and stability of SIP condition of the dictionary  $A$ . One of the fundamental questions is can the Problem 2 be solved to global optimality under these conditions? Because dictionary learning is a bilinear and hence nonconvex problems, solving Problem 2 with  $l_0$  norm could still be intractable even though uniqueness condition exists. Can the author comment on this issue of achieving global optimality for solving Problem 2? As  $l_0$  norm is intractable, does all the properties still hold for  $l_1$  norm minimization? Can we solve it efficiently (polynomial time) to global optimality? Similar issue for other works, such as

<https://arxiv.org/pdf/1807.05595.pdf>

But heuristic methods are proposed there to check global optimality. A discussion and elaboration on this could be very helpful here.

2. The number of samples  $N \geq (k-1) \binom{m}{k}$  for the uniqueness condition grows exponentially with respect to  $k$ . Is this condition optimal w.r.t. SIP property, or can be reduced? On the other hand, is there any relationship between SIP and RIP conditions? The lower bound of (5) looks similar to RIP conditions.

3. Corollary 2 suggests that  $A$  and  $x$  satisfying SIP can be generated by drawing the entries independently from a continuous distribution. This is often unrealizable in practice. Is there any deterministic way of generating  $A$  and  $x$  with SIP condition?

## Additional Questions:

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

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?: Moderately Significant

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?: 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

null:

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

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



**T-SP-24496-2018-rev.pdf**

79K