Author's response to reviews

Title: Estimating view parameters from random projections for Tomography using spherical MDS

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Response to Reviewers

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Please note: In the revised manuscript, we highlight the new added content using yellow color. The grammar corrections are not highlighted in the revised manuscript.
General Answer to Reviewers’ Comments

We thank the second reviewer for providing valuable and constructive comments and suggestions. The major concerns arise from following aspect:

1. How the proposed computational model be adapted to the cryoEM application.

We are sorry that we didn’t address this problem clearly. We have added new experiment in the revised manuscript. Please refer to the related explanations below.
Answers to Reviewer 2's Comments

(Notations: Ci: the $i$th comment; Ai: answer to the $i$th comment.)

C1: I still do not feel right about using simulated 2D projections of a MR image to demonstrate a method that is targeting to totally different applications. If authors feel it is straightforward to extend the method to the actual cryoEM images, why don't try to do so now. Again, if authors think clearly, this proposed method is almost nothing to with MR images. I understand that authors do not want to spend time to redo all the figures. In my opinion, it is worth the time to do so (thinking how long time did it take to response my comments, and those are good responses BTW). It maybe just what it takes to have the paper accepted.

A1: Thank you for your comments.

I am pleased that the reviewer is happy with our previous responses to the comments. We thank you for your interests on the spherical constrained tomography method and its cryoEM application. As we mentioned in our previous response to your comments, we do not constrain our method in a very specific research area. The motivation of this current work is proposing an algorithm that could be used in a spherical tomography case. The focus of our group in general is on the algorithm development.

Thanks for your understanding that we do not want to redo all of the experiments at this moment. In the revised manuscript, we added a new experiment about the application for cryoEM images. We used the images from the online database EMDB (http://www.pdbj.org/emnavi/). On the current stage, we tested on the 2D cryoEM image reconstruction.

We really appreciate that the reviewer has a solid background in the MR image analysis area and believe the comments will improve the quality of our work significantly. We totally understand that the reviewer has the concerns about the applicability to MR images. We are sorry that we afraid that we cannot remove the previous experiments as suggested by the reviewer. The reasons are mainly twofold:

1. Some portions of the experiments are reviewed by the other reviewer. We have modified the experiment based on the reviewer’s valuable suggestion. Therefore, in order to respect the views of other reviewer, we would prefer to leave the previous experiment in the revised manuscript.

2. The similar published methods have also claimed the application to MR images [1, 2, 3]. We select some of the statements and quote here:

   From “Page 1, Para 2” in [1]: “In MRI, patient motion during long scan times can result in unknown angles.”
From “Page 1, Para 2” in [3]: “The problem of unknown view angles has been addressed in various limited contexts. In the case of magnetic resonance imaging (MRI), for example, a good deal of work has been done on studying and overcoming specific types of uncontrollable patient motion”.

We appreciate that the reviewer is an expert in MR area and has very deep understanding for application details for the new proposed model. We do appreciate if the reviewer can contact us for further discussion about the potential extension of the proposed new method. We hope we have addressed the concerns of the reviewer in this round of review. The experiment result has been attached in the next page (Figure 1). We can find that the non-symmetric cryoEM images can be reconstructed correctly but the symmetric cryoEM images can not be reconstructed as it is the limitation for the current computational model.


[2] Yagle AE: A simple non-iterative algorithm for 2-D tomography with unknown view angles. (http://www.eecs.umich.edu/~aey/recent/angle.pdf) (note that if this doesn’t work, please Google the paper and you will find the paper draft).

Figure 1 The reconstruction of the 2D cryoEM projections. The A, B, C are the original cryoEM projections. And the D, E, F are the corresponding reconstruction results.