Reviewer’s report

Title: Temporally constrained ICA with Threshold and its application to fMRI data

Version: 0 Date: 02 Aug 2018

Reviewer: Burak Akin

Reviewer's report:

I think adding and choosing constrains brings extra manual step, taking ICA far from its original aim, being exploratory and modal free nature. But of course it has some advantages like focusing ICA to task-related activity by adding some constraints in mixing matrix which will lead to increase chance of detectability and gaining computation time. This study could be restructured on those two aims. To make a fair comparison in detectability, a task related mask preferably created by using GLM should be compared with all components of TCICA, TCICA-thres, FastICA instead of two chosen. That will give an idea how a method converges to a desired results. Second main point is computation time; it's kind of obvious to see if ICA with prior information would converge faster than blind ICA. I think for computation time assessment, all three methods should be compared with calculation time of GLM. My other comments could be find below.

* Methods(Line23) are not matching with results (Line28), Line24: "(TCICA-Thres) method that performs TCICA outside the threshold and performs FastICA inside the threshold" , comparison results of TCICA and TCICA-thres should be stated in Results(Line28)

* Correlation is not ideal to assess temporal match, because depending on delays, same oscillating frequency (perfectly related with task) with a little shift could give a lower correlation coefficient. In this study TR=2s , is not adequate sampling task related delays but shape of the time course will be different. This should be discussed.

* Line70 "If there are more than one spatial components related to one tasks.. ICA contrast function will contain more than one extreme points" Authors should consider to compare their new ICA method by using this contrast function.

* Line 78 "Accordingly, TCICA is not able to fully extract all the spatially independent components that are related to one task from fMRI data." There is an assumption that more than one or certain amounts of task-related components are expected. What is the relation of performance with respect to #of components? How many task-related components will validate any xxICA method is eligible to "fully extract" task-related components.
* Line 87 "The current study is different from our previous study [10] because…” I think in the Introduction it is not necessary to start comparing with your previous work, would be better to mention first the aim of the work. A similar comparison can be made in Discussion section, while comparing the methods/results.

* Line 91 "The spatial ICA was used in TCICA-Thres in the current study." Is better combined with previous sentence for the sake of clarity.

* Line 94 "all the desired task-related” What do we really mean here by all the desired components? Authors might give a bit more detail here regarding the experiment, or an expected number of components per task, if exists.

* Line 96 Theory part, Sections of 2.1 and 2.2 were already introduced and being used in the literature, hence a detailed description is not necessary in the main text. I suggest removal of long explanation for FastICA and instead a summary can be added before following sections.

* Line 110 "Our proposed method is based on the FastICA algorithm. One sort of object function used in FastICA is negentropy that is defined in (4)[12]." This part rather should be in Sections 2.3, and Section 2.3 might be shortened for an easier flow, and details of the implementation, namely gradient decent optimization, and procedure could either be removed or moved to Appendix.

* Please remove dots after the titles, i.e.(Line344 351 358 365 etc…)  

* I'd suggest using fMRI data instead of "real fMRI data" but I realized that terminology already used in previous publication. fMRI data vs simulation already makes the distinction clear.

* Figure 6 is it group results or single subject should be indicated in caption.

* Figure 5 is hard to believe to be an independent component, to me looks like a mask. Please clarify.

* Line 428 " Both TCICA-Thres and FastICA successfully detected two task-related components." Again assumption of certain number of task-related components, this should be clarified and relative literature should be cited.

* Line 432 instead of "motor output of judgment” decision of finger tapping would be more suitable.
* Line 440 It is not clear how activation mask was created? It is stated as "union of IC1 and IC2" but components of which ICA, fastICA or TCICA-thres? Ideally masks should be created by using GLM results.

* Are there any other components among 28 that which have high spatial correlation with created activation mask?

* Line 510 "TCICA-Thres showed better stability than FastICA, especially for IC2. Because TCICA-Thres does not need to estimate all the components, it had significantly higher computation efficiency than FastICA" This statement has quite outreaching claims, haven't seen any results in this work about comparison of computation efficiency. Either should be removed or relevant results should presented.

**Are the methods appropriate and well described?**
If not, please specify what is required in your comments to the authors.

Yes

**Does the work include the necessary controls?**
If not, please specify which controls are required in your comments to the authors.

No

**Are the conclusions drawn adequately supported by the data shown?**
If not, please explain in your comments to the authors.

No

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If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

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