Reviewer's report

Title: Application of Mean-Shift Clustering to Blood Oxygen Level Dependent Functional MRI Activation Detection

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Reviewer: Yihong Yang

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This paper introduces a mean-shift clustering (MSC) method to the field of functional MRI (fMRI) data analysis. A potential advantage of MSC is to enhance sensitivity in detecting brain activation from fMRI data, which is very important in the field of neuroimaging. Simulated and experimental data were used in the study to demonstrate the true-positive and false-positive rates of the method, compared to traditional cross-correlation analysis (CCA). Effects of the kernel size in MSC on the sensitivity and specificity were also assessed. Overall, the study provides a novel method with a great potential to increase the sensitivity of fMRI significantly.

Some minor modifications may improve the quality of the paper:

1. The SNR levels used in the simulation studies (0.3 and 0.5) need to be justified. Usually, the SNR in real fMRI data with different spatial resolutions (e.g. 2-4 mm) may vary in a much larger range. As such, a larger SNR range should be used in the simulations.

2. In practical fMRI data analysis, “family-wise” clustering methods are often used in the correlation for multiple comparisons. Therefore, a comparison of the “CCA + MSC” method to a “CCA + clustering” method, rather than the CCA only, makes more sense. Is there a way to assess the true-positive and false-positive rates of the “CCA + clustering” method?

3. In the activations maps shown in Fig.4 and 5, please provide the average “z-score” in the activated areas. The threshold maps may not be able to provide complete information on the sensitivity.

Level of interest: An article of importance in its field

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.