Reviewer's report

Title: ROCKETSHIP: a flexible and modular software tool for the planning, processing and analysis of dynamic MRI studies

Version: 5  Date: 7 February 2015

Reviewer: steven sourbron

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Major Revisions

1. The authors present a new software package for DCE-MRI analysis, and motivate this by the observation that all existing packages are "limited" in one way or another (p5, 129). This is undeniably true, but to address this problem by creating a new package is but one solution. The alternative would be to join an existing project (quite a few of them are open source) and help to fix the limitations. In the long run, I believe that the latter is a more constructive solution. The creation of new packages leads to a fragmentation in the field that actually hinders rather than promotes a wider use of these techniques. The authors should provide a stronger motivation for their chosen approach.

2. This will also require a more in-depth review of existing packages, as well as their possibilities and limitations, to identify exactly where ROCKETSHIP proposes to present an improvement. The list provided by the authors (p5) is incomplete, eg. packages such as dcemri (http://dcemri.sourceforge.net/), dcetool (http://thedcetool.com/), or pmi (https://sites.google.com/site/plaresmedima/) are not included. Considering this more extended list, I am not convinced that the limitations pointed out by the authors are not already addressed. For instance, I’m not sure it’s justifiable to say that dcemri does not enable data-driven methods.

In addition, though this is less relevant for the publication, the list of commercial software packages is incomplete. In order to avoid the appearance of bias, the authors should either present a complete list of commercial packages, or else leave them unnamed.

3. Before the implementations section, it would be good to include an explicit list of the product specifications. What exactly is the functionality? Is it designed to be modular/extendable? What is the target audience for this application (eg. radiologists? Physicists? Biologists? Cardiologists? ...), what level of training or expertise is expected, what level of support will be available, product lifetime etc..

4. Software validation (p11-13): it seems to me this paper has a dual purpose: on the one hand, a novel core algorithm for DCE-MRI is proposed (p8-9), and this is validated with application to simulations and two datasets; one the other hand the paper aims to validate the new software designed around this algorithm. These are two entirely different objectives, and I don’t think they should be combined
into one paper as each needs to be performed in considerably more depth in order to be convincing.

A novel fitting algorithm can only be validated by a much broader simulation study and by explicit comparison against existing algorithms in a range of relevant tissue types – this to show that it represents an improvement compared to existing state-of-the-art. This should be done outside the context of a specific software for the sake of transparency and generality. It also requires a higher level of detail in the description of the methods.

The validation of a software tool itself requires a test against the product specifications (which are too vague at this point – see 3). Here I would expect a comparison of results obtained with standard algorithms, to other open-source softwares that implement the same algorithm. This to check that implementation differences do not affect the result. I would expect at this point also more extensive testing with specified users. If, for instance, the software is designed to be suitable for inexperienced radiologists, the results produced by such users could be compared against those of a collection of experts. As for the algorithm, this could also involve a comparison against other softwares in the same users to check whether ROCKETSHIP offers an improvement in that sense. Does the new software allow users to get their results more quickly? With less training? Etc..

5. I don’t think the appendices are necessary in a publication. All of this material can be referenced.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

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