

Diffusion MRI analysis

Citation for published version (APA):

Harms, R. L. (2019). *Diffusion MRI analysis: robust and efficient microstructure modeling*. [Doctoral Thesis, Maastricht University]. ProefschriftMaken. <https://doi.org/10.26481/dis.20191025rh>

Document status and date:

Published: 01/01/2019

DOI:

[10.26481/dis.20191025rh](https://doi.org/10.26481/dis.20191025rh)

Document Version:

Publisher's PDF, also known as Version of record

Please check the document version of this publication:

- A submitted manuscript is the version of the article upon submission and before peer-review. There can be important differences between the submitted version and the official published version of record. People interested in the research are advised to contact the author for the final version of the publication, or visit the DOI to the publisher's website.
- The final author version and the galley proof are versions of the publication after peer review.
- The final published version features the final layout of the paper including the volume, issue and page numbers.

[Link to publication](#)

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal.

If the publication is distributed under the terms of Article 25fa of the Dutch Copyright Act, indicated by the "Taverne" license above, please follow below link for the End User Agreement:

www.umlib.nl/taverne-license

Take down policy

If you believe that this document breaches copyright please contact us at:

repository@maastrichtuniversity.nl

providing details and we will investigate your claim.

Propositions accompanying the dissertation

Diffusion MRI Analysis **Robust and efficient microstructure modeling**

Robbert Harms, Maastricht, 25 oktober 2019

1. For most diffusion MRI models, the Powell optimization algorithm is more efficient and effective than the Levenberg-Marquardt or Nelder-Mead simplex method.
2. With MCMC sampling, thinning and burn-in are generally unnecessary and should be avoided.
3. The use of variance weighted averaging can reduce the overall variance in group statistics and reduce the effect of data artifacts without discarding data from the analysis.
4. When optimizing a model, proper initialization provides run-time, accuracy and precision benefits.
5. Compared to sensitivity, specificity is a more promising goal of diffusion microstructure modeling.
6. A single shared modeling framework, like the one proposed in this thesis, can merge the knowledge from both the model developers and the computer scientists, providing a solid foundation for future dMRI applications.
7. The hardware required to keep up with ever increasing data sizes is already there, it is the lack of parallel processing software that is the bottleneck.
8. Science should place a larger emphasis on procedural epistemology, to structure knowledge not only from a declarative point of view but also from an imperative point of view, for example, as software.
9. *"Hofstadter's Law: It always takes longer than you expect, even when you take into account Hofstadter's Law"*
- Douglas Hofstadter