

## DTI and Fibertools Software Package

Responsible Persons: [Dr. Valerij Kiselev](#), [Dr. Marco Reisert](#) and Susanne Schnell

DTI and fiber tracking is a new and still developing discipline of MR post-processing. So far there is no commercial and easy extendable tool available. Therefore, most groups working on DTI have to develop their own tools in order to process and visualize their DTI datasets. This is very time consuming, needs know-how and costs manpower. In addition, the results between studies and different groups are not comparable, since the used algorithms can differ in some details.

The DTI&FiberTools is implemented under MATLAB . This toolbox provides import-filters for several MR file standards, a processing unit to calculate the diffusion tensors; several GUI based tools to calculate fiber tracks and to evaluate the DTI dataset. The results can be filed as images with 3D impression or can be logged in formatted ASCII files.

The current release contains the following tools and features:

DTI Processing Unit: Calculates the diffusion tensors and their eigenvalues and eigenvectors. Different file formats are supported (like DICOM, Bruker, binary files, Matlab structures). The standard SIEMENS and GE diffusion encoding schemes are supported; other schemes have to be defined in a separate text, .m or .mat file.

FiberTracking:

- Fiber tracking is realized by using the FACT algorithm (Mori et al., Annal. Neurol 1999).
- Probabilistic tracking realized by using the PiCo (Parker et al., JMRI 2003) approach but with DTI data as basis. It is possible to extract pathways between two seeds by combining two maps (Kreher et al., NeuroImage 2008).
- Global Fiber Tracking on basis of HARDI or DTI data. The method is based on the approach reported in (Marco Reisert et al: Global fiber reconstruction becomes practical. NeuroImage 54(2):955-62)

FiberViewer:

- Visualization and Navigation through different data modalities like DTI maps, fiber tracks, diffusion main directions.
- Supports different kinds of DTI maps (e.g. FA, Trace, lambda images ...)
- Creation and manipulation of mask based ROIs.
- Selection of streamline fibers
- Visualization of probabilistic fiber tracking results
- Documentation by logging statistics of ROIs and fiber tracks into text files.
- Import/Export from/to ANALYZE or Nifti

3D Visualizer: Visualization of map slices, ROIs, and fiber tracks with 3D impression.

Batch Editor: Automatic processing of high amounts of data. Possibility to link processing with SPM8 easily.

### HOW to get the current release?

The current release can be received after you fulfilled the following requirements:

- Please let the group leader of your research lab sign the following licence agreement and send it via mail or fax. [\[pdf\]](#)
- In addition, please write an email to [DTI-FiberTools.MR@uniklinik-freiburg.de](mailto:DTI-FiberTools.MR@uniklinik-freiburg.de) with the addresses of your group leader and the name and address of the person working with the tools (may be yourself).
- Once we received everything you can download from [here](#).

### Contact Persons

- [Valerij Kiselev](#)
- [Marco Reisert](#)
- Susanne Schnell

## Requirements

- Tested for Matlab 2006b and 2007a, 2007b, other versions might work as well. For further information visit [www.mathworks.com](http://www.mathworks.com)
- Operating System: For the supported operation system please visit the mathworks homepage. It was tested in our lab and the code was compiled for Linux 32 and 64 bit system and Windows XP 32 bit system. It works on Mac OS, but was not thoroughly tested..
- Data format should be dicoms from Siemens or GE, we also support Bruker format. You can also prepare your data into some specified format in case you have different formats, but this is your responsibility and for this you need some knowledge in Matlab programming.
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- Graphic: The resolution should be at least 1024x800

## Screenshots

Flowchart of the organization of the DTI&FiberTools

GUI and result window of the 3D Visualizer

GUI of the FiberViewer

GUI to create maps

Resulting maps of the optical radiation. Seedareas were defined in the LGN and V1

## Authors

Dr. Björn Kreher, Dr. Marco Reisert, Susanne Schnell, Dr. Kamil Il'yasov

## Publications

- M. Reisert, I. Mader, V.G. Kiselev, Global Reconstruction of Neuronal Fibers. MICCAI 2009, DMFC Workshop, pp. 72-80
- B.W. Kreher, S. Schnell, I. Mader, K.A. Il'yasov, J. Hennig, V.G. Kiselev, D. Saur Connecting and Merging Fibres: Pathway Extraction by Combining Probability Maps. NeuroImage, Volume 43, Issue 1, 15 October 2008, Pages 81-89
- Björn Kreher, Susanne Schnell, Jürgen Hennig, Kamil Il'yasov: DTI&FiberTools: DTI Calculation, Fiber-Tracking, and Combined Evaluation Consolidated in a Complete Toolbox. Proceedings of the 12th Annual Meeting of the Organization for Human Brain Mapping, Florence, Italy, 2006
- Björn Kreher, Jürgen Hennig, Kamil Il'yasov: DTI&FiberTools: A Complete Toolbox for DTI Calculation, Fiber Tracking, and Combined Evaluation. Proceeding of ISMRM 14th International Scientific Meeting, Seattle, USA, 2006

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