EIDORS Version 3.9

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Abstract: This paper announces the release of version 3.9 of the EIDORS software suite. We review its new features, and discusses its growth and citations.

1 Introduction

We proudly announce the release of EIDORS version 3.9, for the 18th Int. Conf. on Biomedical Applications of EIT, in June 2017. The software is available at eidors.org and licensed under the GNU GPLv2 or GPLv3. Archived versions are now available on Zenodo [1] (and v3.8 [2]).

EIDORS aims to provide free software algorithms for forward modelling and inverse solutions of Electrical Impedance and (to some extent) Diffusion-based Optical Tomography, in medical, industrial and geophysical settings and to share data and promote collaboration.

2 New Features

Release 3.9 of EIDORS builds upon a strong foundation in reconstruction algorithms, adding and improving a number of aspects.

- Faster forward solve times for real conductivity distributions
- Improved support for GREIT reconstructions in 3D [3]
- New hyperparameter selection approaches [4]
- Interface to "Regularization Toolbox" [5]
- Gmsh-based human 3D model interface [3]
- Correction of artefacts caused by low frame rates [6]
- Improved support for mixed point and CEM electrode models
- Support for $2\frac{1}{2}$D solvers (including a rank-1 $2\frac{1}{2}$D movement Jacobian) [7]
- Forward solve supporting model reduction (i.e. efficient precalculation of out-of-field regions) [8]
- Improved testing framework esp. for core solver algs
- Improved support for geophysical FEM models
- Improved support for Octave
- Updated ability to load recent device file formats including auxiliary data (Dräger and Swisstom formats)
- Expanded shape library

3 Growth

EIDORS-related citations continue to grow. Current citation results are shown in table 1. The EIDORS code-base is growing (fig. 1) with significant effort being applied to improving test coverage, refining performance and implementing new features. In 2012, a `dev` (development) staging area was created for contributions in progress.

Table 1: EIDORS Citations (May 2017, scholar.google.com).

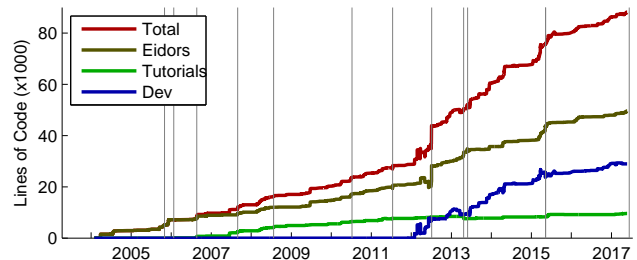| Paper	Date	Citations
[9] A MATLAB package for the EIDORS project …	2001	207
[10] Image reconstruction algorithms for …	2002	127
[11] A Matlab toolkit for three-dimensional …	2002	367
[12] EIDORS: Towards a community-based …	2005	10
[13] Uses and abuses of EIDORS: An extensible …	2006	334
[14] Simple FEMs aren't as good as we thought …	2008	19
[15] EIDORS version 3.8	2015	4

Figure 1: Lines of Code (LoC) in Matlab files in the EIDORS code-base vs. time; Total (red), Eidors (i.e. release branch, brown), Tutorials (green), development code (blue). Releases are indicated by gray bars.

4 Discussion

The structure of EIDORS has been relatively stable due, in part, to some early design choices: a modular framework and data structure, cross-platform support, integration of meshing, tutorials, and the contributed data repository. These aspects, along with an open source code-base, have enabled EIDORS to maintain research relevance. Presenting version 3.9!

Acknowledgements

References

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