EIDORS Version 3.10

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Abstract: This paper announces the release of version 3.10 of the EIDORS software suite. We review its new features, and discusses its growth and use.

1   Introduction

We proudly announce the release of EIDORS version 3.10, for the 20th Int. Conf. on Biomedical Applications of EIT, in July 2019. The software is available at eidors.org and licensed under the GNU GPLv2 or GPLv3. Archived versions are now available on Zenodo [1–4].

EIDORS provides 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. EIDORS also aims to share data and promote collaboration amongst its users.

2   New Features

Release 3.10 of EIDORS builds upon a strong foundation in reconstruction algorithms, adding and improving a number of aspects.

- Modelling and management of internal electrodes.
- New electrode specifications on electrode faces (in addition to nodes)
- Improved FEM utility methods (mesh merging, removal, faster boundary calculations)
- Improved support for GNU Octave
- Improved support for GREIT reconstructions in 3D [5]
- Support for caching to disk
- Improved graphics and visualization functions
- Improved support for geophysical FEM models
- Updated utilities for device file formats (new datafile_utility) and integration with SenTec ibeX software.
- Expanded shape library with new species shapes
- (As always) bug fixes

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 (June 2019, scholar.google.com).

| Paper	Date	Citations
[6] A MATLAB package for the EIDORS project …	2001	255
[7] Image reconstruction algorithms for …	2002	150
[8] A Matlab toolkit for three-dimensional …	2002	417
[9] EIDORS: Towards a community-based …	2005	17
[10] Uses and abuses of EIDORS: An extensible …	2006	519
[11] Simple FEMs aren't as good as we thought …	2008	20
[12] EIDORS version 3.8	2015	4
[13] EIDORS version 3.9	2017	6
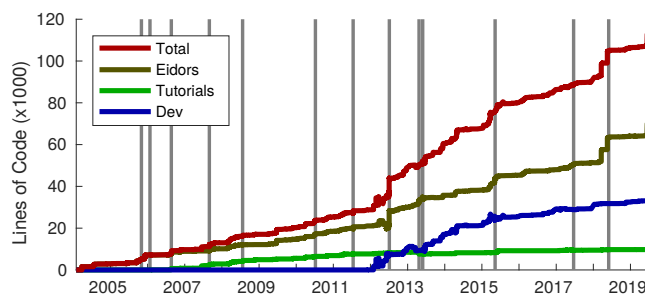
Figure 1: Lines of Code (LoC) in Matlab files in the EIDORS codebase vs. time; Total (red), EIDORS (i.e. release branch, brown), Tutorials (green), development code (blue). Releases are indicated by gray bars (The 3.10 release is at the right).

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. Version 3.10 (hopefully) continues the tradition.

References

[1] Adler A, "EIDORS version 3.10", DOI:10.5281/zenodo.3247168, 2019.

[2] Adler A *et al*, "EIDORS version 3.9.1", DOI:10.5281/zenodo.1257670, 2018.

[3] Adler A *et al*, "EIDORS v3.9", DOI:10.5281/zenodo.583266, 2017.

[4] Adler A *et al*, "EIDORS v3.8", DOI:10.5281/zenodo.17559, 2015.

[5] Grychtol B *et al* https://iopscience.iop.org/article/10.1088/1361-6579/ab291d *Physiol Meas*, 2019.

[6] Vauhkonen M, Lionheart WRB *et al*, *Physiol Meas*, 22:107–111, 2001.

[7] Polydorides N, *Ph.D. thesis*, U Manchester, UK, 2002.

[8] Polydorides N, Lionheart WRB, *Meas Sci Tech*, 13:1871–1883, 2002.

[9] Adler A, Lionheart WRB, *Proc EIT2005*, London, UK, 2005.

[10] Adler A, Lionheart WRB, *Physiol Meas* 27:S25–S42, 2006.

[11] Adler A, Borsic A *et al*, *Proc EIT2008*, Hannover, NH, USA, 2008.

[12] Adler A *et al*, *Proc EIT2015*, p.19, Neuchâtel, Switzerland, 2015.

[13] Adler A *et al*, *Proc EIT2017*, p.63, Dartmouth, NH, USA, 2017.