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Open Solutions for Biomedical Research

What can open-source software do for biomedical research? Based on our experience at the National Alliance for Medical Image Computing (NA-MIC), we believe that open source software can be used very effectively to either directly solve biomedical research problems or improve the infrastructure that will enable others to solve it.

Research done nationwide by NA-MIC-associated researchers provides a case in point: Neuroscientists, clinicians, and biomedical researchers at Harvard Medical School, Johns Hopkins University, the University of North Carolina at Chapel Hill, and the University of New Mexico all use NA-MIC's open-source software tools routinely. They analyze anatomical brain connectivity abnormalities in patients with velo-cardio facial syndrome (VCFS); perform robot and image-guided biopsies for prostate cancer; monitor



migrate to a FOSS model, we deploy NA-MIC resources to aid the migration. In either case, we consistently seek opportunities to enhance the NA-MIC platform by supporting “faster, better, cheaper” computation on increasingly complex medical images. This is possible because NA-MIC has adopted a BSD-style open source license for our infrastructure software, which allows research and commercial entities unrestricted access to build upon the NA-MIC software platform without any “give back” requirements.

And because our open source software is free, it also has the potential to impact a broad segment of the research community. To realize that potential, NA-MIC

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the progression of Lupus lesions in patients; and study cortical thickness as a predictor for autism. The needs of these specific biomedical problems drive the efforts of computational scientists and software engineers in the development of a Free and Open-Source Software (FOSS) toolkit, the NA-MIC Kit, to enable biomedical research.

At NA-MIC we've seen that biomedical research needs can more easily drive tool development when the tools are open source. That's because open source tools can be modified to suit researchers' needs. In accordance with our mandate as a National Center for Biomedical Computing, our mode of operation in NA-MIC has been to focus as a team on one set of biomedical problems at a time (we started with schizophrenia and expanded to include lupus, autism, prostate cancer, and VCFS) in order to identify gaps in the available image analysis algorithms and software tools, and then design solutions. To fill such gaps, we may create new computational technology, deploying them through the NA-MIC Kit; or when the gaps are better addressed by helping owners of existing computational solutions

has applied significant resources to establish a dissemination program that has trained over 600 biomedical engineers and scientists from institutions around the country in the use of our tools. In addition to the detailed training materials that we provide through our Web site (<http://www.namic.org>), our hands-on training sessions are particularly effective in creating “super users” of our technology who in turn train groups in their home institutions and serve as NA-MIC ambassadors to the broader research community. We also have an active and open community process in place for those who choose to participate. This includes, wikis, teleconferences, mailing lists, and in-person events, all of which are publicly available through our Web site.

We invite you to browse three specific end-to-end Open Science solutions that we have developed in NA-MIC recently for three separate biomedical research problems 1) Automatic Regional Cortical Thickness Assessment for Autism, 2) Segmentation for Non-human Primate Brains, and 3) Planning Therapy for Prostate Cancer at <http://wiki.na-mic.org/Wiki/index.php/Events:TutorialContestJan2009>. □