

Two-way communication of imaging data over the Internet using ImageJ

Abstract:

Two-way communication of imaging data over the Internet using ImageJ

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A common challenge in digital microscopy is the management and further analysis of obtained image measurements. This process usually involves data exchange between heterogeneous software packages. Most frequently, such data transfer is hampered by incompatibility of the proprietary file formats or communication protocols. Another challenge is the use of acquisition and data management systems across the Internet or local area networks. Ideally, obtained data should be directly available for use in other applications either by remote instrument read-out or by serving the data upon application request. The use of open-source solutions for processing, management and exchange of imaging data, comprising so called “middleware”, can overcome these challenges and, as consequence, can greatly facilitate derivative data analysis and reduce processing times.

Here, I present an open-source integrated framework (OIF) for upload, management and querying of multiple sets of microscopic measurements. The OIF is based on a 3-tier architecture including database backend, web-based communication layer implementing the middle-tier logic, and an image processing and measurement front end. The back-end is based on a MySQL database server; the front-end includes a set of ImageJ plugins. Through the use of a web-service communication layer based on the widely used SOAP and WSDL protocols (<http://www.w3.org/TR/wsdl>) supported by the World Wide Web Consortium, it is possible to interact remotely with any other applications implementing web-services. The communication layer was implemented in the popular web language PHP. OIF supports authentication layer and can accommodate for and store arbitrary types of measurements, regions of interest, calibrations and ImageJ settings. A prototype of an information system for management of image measurements based on OIF is available for demonstration at <http://www.diagnosticarea.com/labis>. The system has a web-based interface and allows for remote management and querying of the experimental data and stored images. I will demonstrate the operation of the system using biological microscopic images. Further possibilities for development include interoperability with data analysis platforms such as Matlab (Mathworks), the “R” statistical platforms and TrakEM2.

Keywords:

web-services; database; communication technologies; PHP; Java; MySQL

Requirements

none

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Organisation

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Short Biography

Scientific interests

- selective electrical stimulation and recording of the brain activity
- digital microscopy and imaging
- development of ImageJ
- statistical and mathematical modelling

Education

PhD degree in neurosciences - Twente University, Enschede, The Netherlands; Dissertation - "Morphometric analysis of the rat lower limb nerves. Anatomical data for neural prosthesis design"

Medical Doctor (MD) degree - Medical University - Sofia, Sofia, Bulgaria

1993 – 1999: majors: Internal medicine, Surgery, Obstetrics and Gynecology, Hygiene and Public Health, Pediatrics; elective: Pharmacology (excellent score)

Formation in Clinical Pharmacology, Medical University - Sofia

2000 – 2002: curriculum - rationalization of therapies, ethical aspects (informed consent), adverse effects recognition and reporting, clinical trial design, teaching assignments

Professional experience

2008 – Bioelectronics Systems, IMEC and Laboratory for Experimental Functional Neurosurgery, Catholic University of Leuven (KULeuven), Leuven, Belgium

- Development and testing of a multielectrode array probe for brain stimulation and recording

2007 – 2008 Research Center for Cellular and Molecular Neurobiology, Faculty of Medicine, University of Liege, Liege, Belgium

- Postdoc research in vagus nerve stimulation and "cortical spreading depression of activity" in the neurophysiology of migraine

2006 – 2007 Neural Engineering Rehabilitation Laboratory, Faculty of Medicine, Université Catholique de Louvain, Brussels, Belgium

- Postdoc research on peripheral nerves neurophysiology (IBRO John G. Nicholls Fellow)

2002 – 2006 Neuroregulation Group, Leiden University Medical Center, Leiden & Biomedical Signals and Systems group, Twente University, Enschede, The Netherlands

- Doctoral research on the anatomy and electrical stimulation of peripheral nerves

2000 - 2002 USMeds Inc, Sofia, Bulgaria

- project manager: clinical diagnostic tests and dental hygiene products

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