



Open source tools for pathology

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Abstract

Introduction: Open source is an approach to software development aimed at providing not only compiled software, but also source code, and allowing modifications and enhancement by third parties, with some constraint to protect intellectual rights of authors. Open source is often considered only for its apparent gratuity, but this is not always the case, as a business model exists also for open source, centred around maintenance and personalization.

Main Reasons: Open source in Medicine might be of interest for at least three main reasons. The first one is the possibility of avoiding vendor –locking, i.e., the strict link between software and its provider. In fact, while current medical software is usually proprietary, meaning that changing maintainer means changing software too. With open source, the initial maintainer can be substituted if inadequate, while maintaining the same software.

Another reason is related to software involved in research, for example in image processing. Having the source code, it is possible to independently verify the algorithms implementation, thus discriminating between possibly fallacious algorithms and possibly fallacious implementation.

Finally, the “free” aspect of open source may allow for systems adoption in developing countries.

Open source in Pathology: Until now, Pathology has been centred around a strictly analog device, i.e., the microscope; however images can be digitized, processed, analysed, and communicated. In the recent years, some software has been developed according to the open source principles that can be applied for pathology image processing and analysis.

At the basis of all there is a generic biomedical image processing tool, ImageJ (1), that can be extended by means of plugins, macros, Java code, etc. This has been then used for a number of other tools, including LargeMontage (2) for montage of digital slides, MicroManager

(3) for multidimensional microscope images (like confocal images or in- vivo recordings), and eSlide (4), for digital slide acquisition and visualization.

Another class of open source tools has been developed for Tissue Micro Array management, including Stanford TMA (5), TMAJ (6) and TIMAN (7).

Finally, one open source web application for telepathology is available (iPath, (8)) and also a generic telemedicine tool that can be successfully adopted for static telepathology (TelemedMail, (9)).

All these tools can be seen as the first of a series that will become available in the future for Pathology applications.

References

- 1) NIH. ImageJ. <http://rsb.info.nih.gov/ij/>
- 2) U. of Tampere, Finland. LargeMontage. <http://www.cs.uta.fi/~vt72556/software/largemontage/>
- 3) UCSF, USA. Micro-Manager. <http://micro-manager.org>
- 4) U. of Udine, Italy. eSlide. <http://www.eslide.net>
- 5) U. Stanford, USA: Stanford TMA. <http://genome-www.stanford.edu/TMA/>
- 6) John Hopkins U., USA. TMAJ. <http://tmaj.pathology.jhmi.edu/>
- 7) U. of Udine, Italy. TIMAN. <http://mitel.dimi.uniud.it/timan/>
- 8) U. of Basel, Switzerland. iPath. <http://ipath.ch>
- 9) MIT. TelemedMail. <http://sourceforge.net/projects/telemedmail>