



XML-based Image Annotation: PAIS – a Personal Annotated Image Server

Lober WB ^{a,b}, Brinkley JB ^{b,a}

^a Division of Biomedical and Health Informatics, Department of Medical Education

^b Structural Informatics Group, Department of Biological Structure
University of Washington School of Medicine



UNIVERSITY OF WASHINGTON
MEDICAL CENTER

Introduction

Images are an effective medium for conveying information, both in medical education and clinical care. But, it is challenging to electronically capture expert knowledge about the content of images.

We have developed a system which facilitates the authoring of graphical and textual image annotations, and stores these annotations using an Extended Markup Language (XML) schema.

The Problem: Adding Knowledge to Images

Many types of images are used in medicine, by many different image consumers. Image interpretation data (e.g., a radiologist's report) typically do not contain graphic spatial information. Also, there is no easily usable, standardized format for storage of image annotations, to facilitate simultaneous use of images from different domains.

Storing Images and Knowledge

Image files and annotation files are stored as separate objects on a web server. The client accesses these objects and allows selective viewing of the annotations.

Our current annotation model supports some global image metadata, as well as an "outline" model where regions are "tagged" by a label, a "string" and a "pin"

One Solution:

We have developed a portable, domain independent, easy to use, tool for annotation of GIF and JPEG images. The annotation metadata is stored in a separate file, using our Image Markup Language format. The authoring tool is a Java 1.1 application, while the client tool is a Java 2 applet, delivered via server.

Both authoring and client software are written in Java, and are open source.

Challenges

The present challenge is to integrate medical images, and the words about them, in a way that helps students understand the content of those images. We hope this integration of images and words will eventually help clinicians discuss the significance of diagnostic data from multiple imaging modalities. Along the way, we must develop a searchable, distributed, knowledge-based, method of indexing and sharing image collections.

Conclusion

The software described here is not a finished product. It represents only the first steps towards both a light-weight, domain-independent format to facilitate the annotation of medical images, and tools that are general, portable, and easy to use.

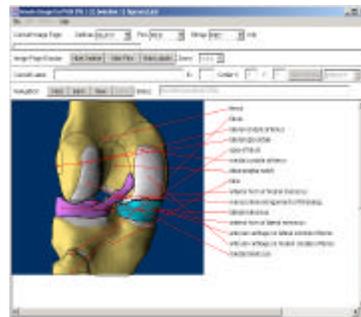
This is still beta software, but we hope that by releasing it as open source, we may encourage others to join this effort.

1. Download Sample Atlas



The download gives you a small sample of images and annotations, the AnnotImage authoring tool, the ImageApplet client, plus a shortcut, a web page, and a couple of XML parser files to make it work.
<http://faculty.washington.edu/lober/pais>.

2. Create Image Annotations



Replace the sample images with your own GIFS or JPEGS, and create annotations for them.

The authoring tool is a Java 1.1 application, which requires that a Java Software Development Kit (SDK) or Java Runtime Environment (JRE) be installed. These are both available for a number of platforms, freely downloadable, from Sun Microsystems.
<http://java.sun.com/2se>

Presently, the tool creates annotation files using Image Markup Language 1.0, an XML schema submitted to XML.ORG, and available at <http://faculty.washington.edu/lober/iml>.

3. Drag Folder to Web Server



The applet based architecture of the client software means that little demand is placed on the server; there are no product-specific configuration issues.

There are no server-side code, cgi scripts or programs, etc. In fact, there is nothing to install on the server side – just copy the image collection folder to a location where your web server will allow the files to be accessed by name from a browser, and the client.

Further Information

Bill Lober, MD, lober@u.washington.edu,
<http://faculty.washington.edu/lober/pais>

This work is available as "open source", under the GNU public license. The full distribution, including source code, is available at the above URL. There is also a mailing list and archive at that address.

This work is supported under the extramural Informatics Fellowship program (F38 LM00086) of the National Library of Medicine.

Example images from the University of Washington Digital Anatomist
<http://sig.biustr.washington.edu/projects/da>.

4. View Images on the Web



The client is a Java 2 applet, which requires freely downloadable software from Sun Microsystems
<http://java.sun.com/products/plugin/index.html>). The web page supplied with the sample image collection looks for this "Java 2 Plug-in". If the plug-in is absent, common the first time the client is run on a particular computer, the web page requests permission, then automatically downloads and installs the software from Sun. Once the "plug-in" is present, it does not need to be reinstalled.

Sun describes the plug-in as working with "recent" releases of Internet Explorer and Netscape, which I believe means version 4 or greater in both cases.