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# Online image tagging system

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# Online Image Tagging

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#### **Technology and Transfe**

Medical Records Companies can use Image Tagging System to improve the quality, consistency, usefulness of the data by providing: Flexible Metadata to 3D and 2D Images. The Project Supports for Standards Better Queries and Enhanced Collaboration.



A radiologist analyzes an X-ray image, and writes his observations on papers

Online Image Tagging is a developed software that allows users of the CenSSIS Image Database to associate detailed metadata with specific regions of images, a process we refer to as "Image Tagging."

The process of image tagging involves using the Image Tagging interface to draw an outline around a region of interest in an image. Once the area has been selected, a label can be placed on it and additional metadata can be associated with it. The metadata can contain custom XML tags in addition to the standard XML elements that the general tag data is stored in. Eventually, users will be able to query these tags via the database interface.

The benefit of having this additional metadata available is that it provides a finer level of detail for querying. It allows users to find more specific features in images than the coarser metadata originally available. Image Tagging improves the quality, consistency, and usefulness of the data in the database.

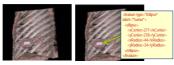
#### XML and Java

The use of XML is an integral part of the Image Tagging system. XML is an extensible markup language, which means it provides a basic format for data markup, the details of which can be customized to suit the needs of the specific data.

XML is a well-supported standard which means that there are many tools available to organize and manipulate the data. Oracle, the platform that CenSSIS-DB uses, has powerful XML querying capabilities. It is the use of XML that makes this image tagging system different from other systems, which use either proprietary or unstructured ASCII text formats.

The project uses XML schema to store the tag data. The schema has to handle both the positional data of the tags as well as the actual metadata associated with them.

#### Image Tagging

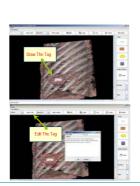


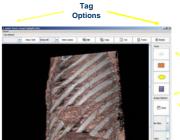
- Metadata Associated with Specific Areas
- Query for Specific Image Features

#### The Image Tagging Interface

Features of the Image Tagging System

- Draw rectangular, elliptical, and polygonal tags, in a manner similar to a standard drawing program.
- · View and edit metadata information associated with tags.
- · Delete, Cut, Copy and Paste tags.
- Apply filters to the image, like high and low passes and edge detection.
- Zoom in/out

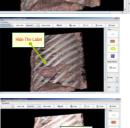




Drawing

Tools

Image Options





#### CenSSIS Image Database

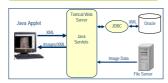
The CenSSIS Image Database is a scientific database that enables effective data management and collaboration to accelerate fundamental research. The system incorporates efficient submission and retrieval of images and metadata, indexing of metadata for efficient searching, and complex relational query capabilities.



Raw Image File from CenSSIS DB that shows a tumor in the left lung

- Difficult to Describe Areas of Interest
- Difficult to Find Specific Features in Images
- Global Image Metadata Too Coarse

#### Image Tagging Implementation



The Image Tagging is implemented in Java (as an applet), which provides native XML support and is cross-platform compatible. The project has a complex but highly extensible design. The applet interacts with Java servlet in order to exchange information with the Image database. The applet requests image and XML data from the servlet, which uses JDBC to interface with the database and retrieve the data. The data then is sent by the servlet to the applet via HTTP. Saving data is done in a similar manner; the applet POSTs the XML data to the servlet as an HTTP POST request, and then the servlet inserts the data into the database.

#### Role of Image Tagging

Image Tagging System is a very useful and powerful complement to the CenSSIS-DB system. The additional, more refined metadata that it supports greatly extends the querying abilities of the database, allowing for more specific searches and more relevant results.

Image Tagging System can be used as a collaboration tool as well.

For example:

Researcher #1: looking for a specific feature in a certain image from the DB; doesn't know exactly where it is. Calls or emails Researcher #2.

Researcher #2: at another location does know where it is: logs into database, Tags the region, saves it. Researcher #1: refreshes his browser, sees the region (and metadata). Added bonus: Information now in database for everyone to see benefit from.

#### Conclusions

- Image Tagging improves the quality, consistency.
  - Usefulness of the data by providing:
    - · Flexible Metadata
    - · Support for Standards
    - · Better Queries
    - · Enhanced Collaboration

