



medGIFT – Using the GNU Image Finding Tool for medical image retrieval

Oshca
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Henning Müller
Service of medical informatics
University hospitals of Geneva
Geneva, Switzerland

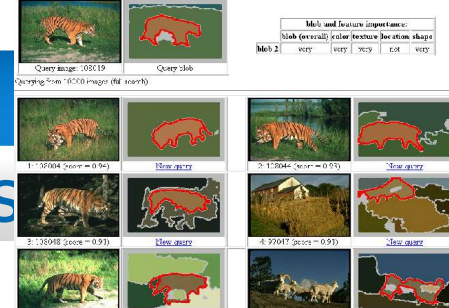


Overview

- Medical image retrieval
- Content-based data access
 - Possible use in medicine
- GIFT
- medGIFT
- Benefits and problems of open source
- Oshca

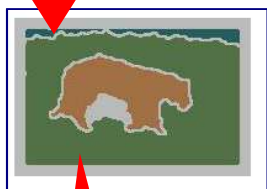
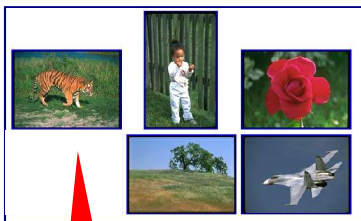


- Access to the data generally by patient ID
 - PACS systems
- Teaching databases allow search for structured data and free text
- Natural language processing to analyze radiology reports and electronic patient record
- Much knowledge is stored implicitly in the images (and the connected text)
 - Case-based reasoning
 - Evidence-based medicine



- Developed due to the exploding creation of multimedia data and the availability of it often on the web, but also within companies (CNN)
- Annotation is expensive, thus only possible in commercially interesting domains
 - Subjectivity, spelling errors, ...
- Goal is to have a data access based on automatically extracted visual features
 - Query by example – “Show me images like this one”
 - Problem to have a starting point for a query
 - Advantages and problems need to be understood for proper use

Blobworld, Berkeley



Adjust the weights below if you'd like, then click "Submit."

	Not	Somewhat	Very
How important is the selected region?	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
How important are the features of this region?			
Color	<input type="radio"/>	<input type="radio"/>	<input checked="" type="radio"/>
Texture	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>
Location	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>
Shape/Size	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Not	Somewhat	Very
How important is the background (everything outside the region)?	<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>



11: 330053 (score = 0.98)



13: 83022 (score = 0.97)



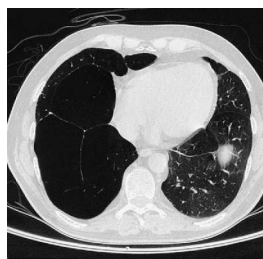
15: 268041 (score = 0.97)



17: 18037 (score = 0.97)

Benefits from medical image retrieval

- Teaching
 - Students
 - Lecturers
- Research
 - Retrieval of good cases
 - Include image features into studies
- Diagnostic aid



?



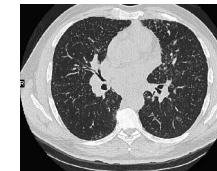
Emphysema





Macro nodules



Emphysema



Micro nodules

- GNU Image Finding Tool
 - <http://www.gnu.org/software/gift>
- Outcome of the Viper project of the University of Geneva (Visual Information Processing for Enhanced Retrieval)
 - <http://viper.unige.ch/> 
- Framework of components for image retrieval
 - Feature extraction, data access, interface, query engine, MRML (<http://www.mrml.net/>) 
- Research project!
- Based on Linux, perl, php, ...
- Plugin for GIMP, Konqueror, kmrml, ...

- Adaptation of GIFT for the retrieval of medical images
 - More importance on gray scales, textures
 - Interface that shows more information than just the images
 - Link to the casimage teaching file system
(<http://www.casimage.com/>) **CASIM@GE**
- Research project!
 - Work in progress

Demonstration

VIPER ONLINE DEMO - Mozilla {Build ID: 2003021008}

File Edit View Go Bookmarks Tools Window Help Debug QA

Back Forward Reload Stop <http://cih-dm26.hcuge.ch/~julien/index.php> Search Print

Home Bookmarks

Top Up First Previous Next Last Document More

Sidebar Tabs
 ▶ What's Related
 ▼ Search
 Search Results

using Google

Images result

Nocardiosis Query Image Similarity: 1.000000	Nocardiose Similarity: 1.000000	Nocardiosis Similarity: 0.600854	Nocardiose Similarity: 0.600854	Nocardiosis Similarity: 0.540700
Neutral top				
Nocardiose Similarity: 0.540700	Silicose Similarity: 0.529154	Silicosis Similarity: 0.529154	Syndrome de MacLeod-Swyer-James Similarity: 0.522361	MacLeod-Swyer-James syndrome Similarity: 0.522361
Neutral top				
Churg-Strauss syndrome Similarity: 0.504078	Syndrome de Churg-Strauss Similarity: 0.504078	Bronchiolitis obliterans or c... Similarity: 0.487049	Bronchiolite oblitérante ou c... Similarity: 0.487049	Amiodarone lung toxicity Similarity: 0.486263
Neutral top				

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Advantages of open source

- Allows to create a community of users
 - For us: continuation of the project after the developers left
 - Dynamic in the community can help everyone
- Very effective communication structure
- Feedback from others and bug fixes
 - Gratification of the software being used
- Better code and documentation quality
 - Use of sourceforge for student projects
- Research might be different than application integration



Problems with open source

- Development often depends on one main developer who is pushing hard
- Big projects can big attention, smaller ones not necessarily
- Even when it is being used not everything is coming back to the community
- We still depend on vendors to make the software being used
 - Liability, maintenance, service, ...
- Not free! Integration needs to be planned

- Create a repository (portal) of available projects, tools and publications
 - Link the information and make it available in an easier way (yes, all the info is out there)
 - >70 projects in radiology on sourceforge alone
- Community of communities
 - Interconnection of the various projects
- Create contacts/information for vendors as well



Conclusion

- Presentation of one open source research project in the medical domain
 - medGIFT
- Advantages and problems with open source based on the experience in the project
- Importance of oshca to promote open source software in the medical domain