Computerized Reviewer Assignment & Search Program (CRASP®)

Developed by Arthur A. Petrosian, SRA/CSR, and Ashot Petrosian, UT/Austin, July 2003

Objectives:

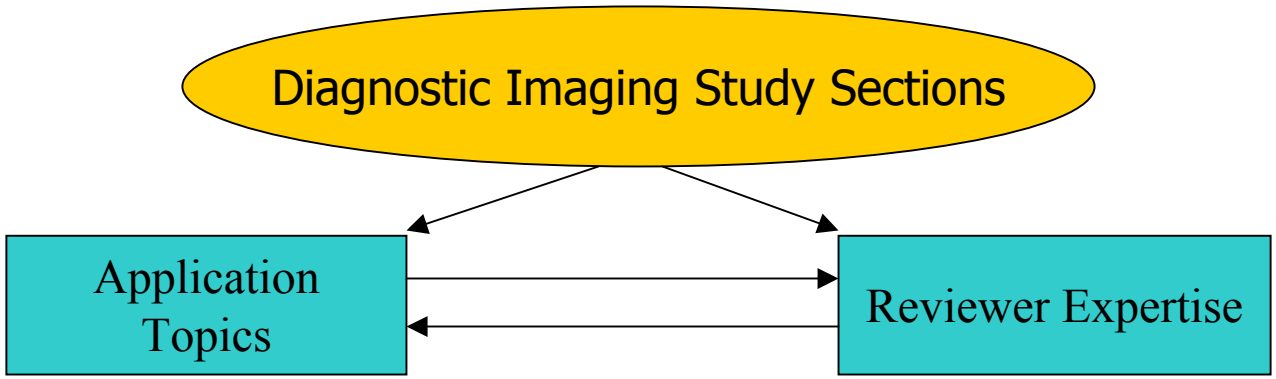
- Finding reviewers with expertise that matches best with application areas at a given *ad hoc* Imaging Study Section
- Making optimum reviewer assignments that will:

  a) minimize the number of reviewers to attend the *ad hoc* Study Section

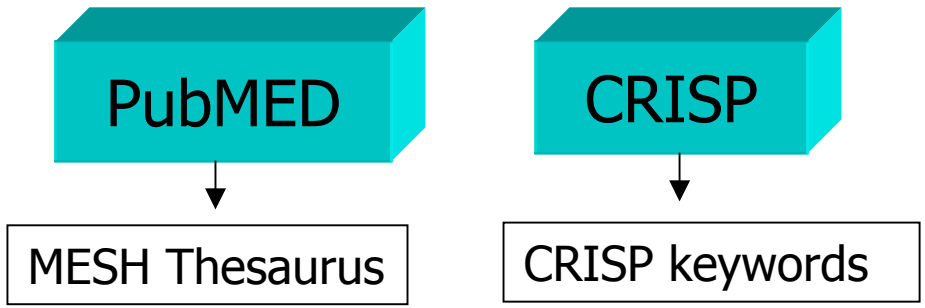
  b) adequately cover all application areas to be reviewed at that Study Section

  c) equalize the number of assignments per reviewer

Information Resources



Databases:



Diagnostic Imaging Search Domains

Mesh Tree Sub-branch:

- Diagnostic Imaging [E01.370.350]
  - Image Interpretation, Computer-Assisted [E01.370.350.350] +
  - Imaging, Three-Dimensional [E01.370.350.400] +
  - Magnetic Resonance Imaging [E01.370.350.500] +
  - Microscopy, Electron [E01.370.350.510] +
  - Photography [E01.370.350.600] +
  - Radiography [E01.370.350.700] +
  - Radionuclide Imaging [E01.370.350.710] +
  - Spectroscopy, Near-Infrared [E01.370.350.750]
  - Subtraction Technique [E01.370.350.760] +
  - Thermography [E01.370.350.800]
  - Tomography [E01.370.350.825] +
  - Transillumination [E01.370.350.840]
  - Ultrasonography [E01.370.350.850] +

CRISP keywords:

13229 – bioimaging/biomedical imaging

13230 – cardiovascular imaging

13231 – angiography

13232 – angiocardiography

…

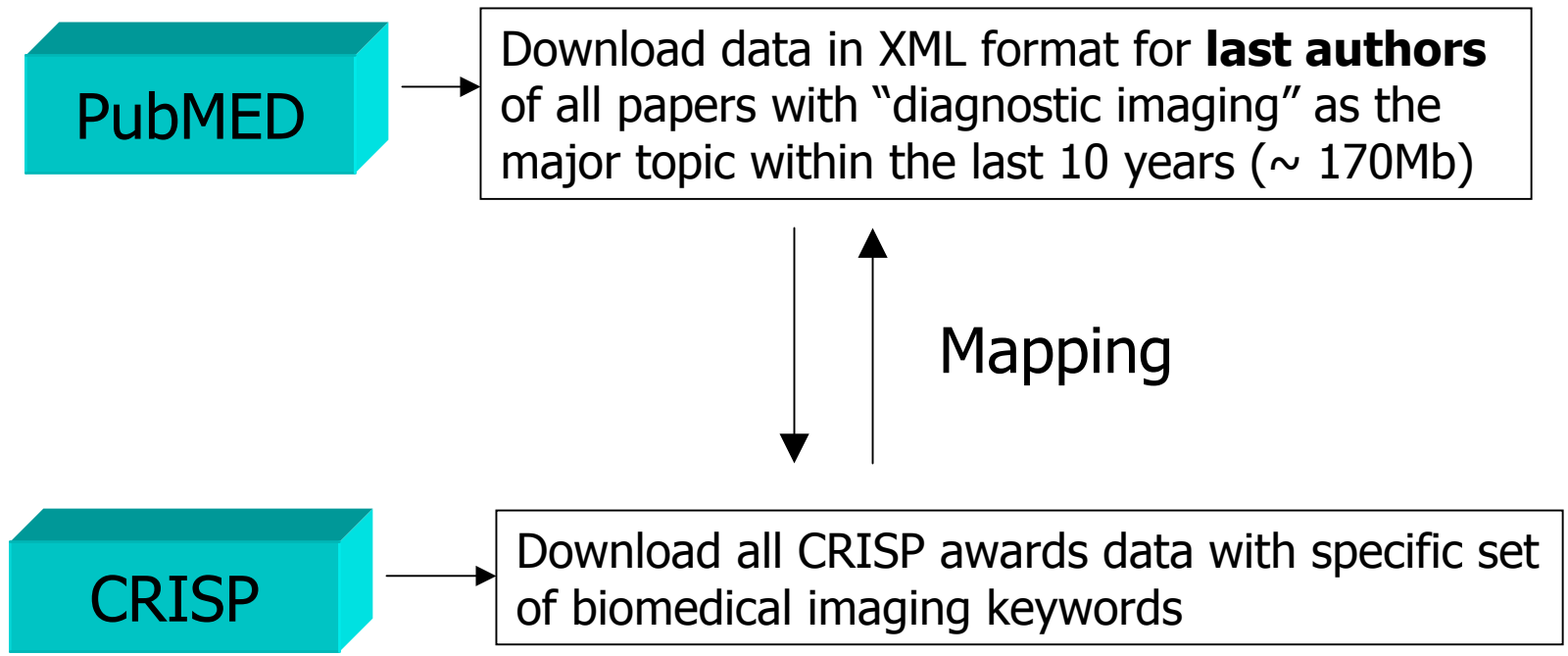
13349 – ultrasonography

13350 – angiocardioultrasonography

13351 – heart sonography

13352 – ultrasound blood flow …

Reviewer Data Download



Program Shell - Loading PubMed and CRISP Data

```
opening file..
..file opened
splitting..
done.
--------------------------------------------------------------------------------
Please choose one of the following options:
[1] Load info from PubMed XML file.      [2] Load info from CRISP files.
[3] Load database (overwrites current)   [4] Save Database (overwrites previous)
[5] Remap MESH and CRISP keywords        [6] Generate individual HTML pages
[7] Load XML/CRISP/Map/Generate HTML (overnighter) [8] Search Help     [9] Quit
[10] Perform optimization
*There are 17203 people in loaded database.*
   -964 of them have at least one CRISP article
--------------------------------------------------------------------------------
```

Extracting Info from Downloaded Databases

Tags used for extracting info:

[First:First Name] [Last:Last Name] [Initials:Initials]

[Affiliation: Affiliation String] [Mapped: Mapped Terms]

[MESH: MESH and CRISP terms [CRISP:yes/no] [Text: Abstracts and Titles]

The default search tag is `Mapped', and all terms are and-ed together.

Mapped and MESH tags can have multiple strings separated by 'and'

and Text searches can have multiple searches separated by 'or'.

Grouping Search Terms

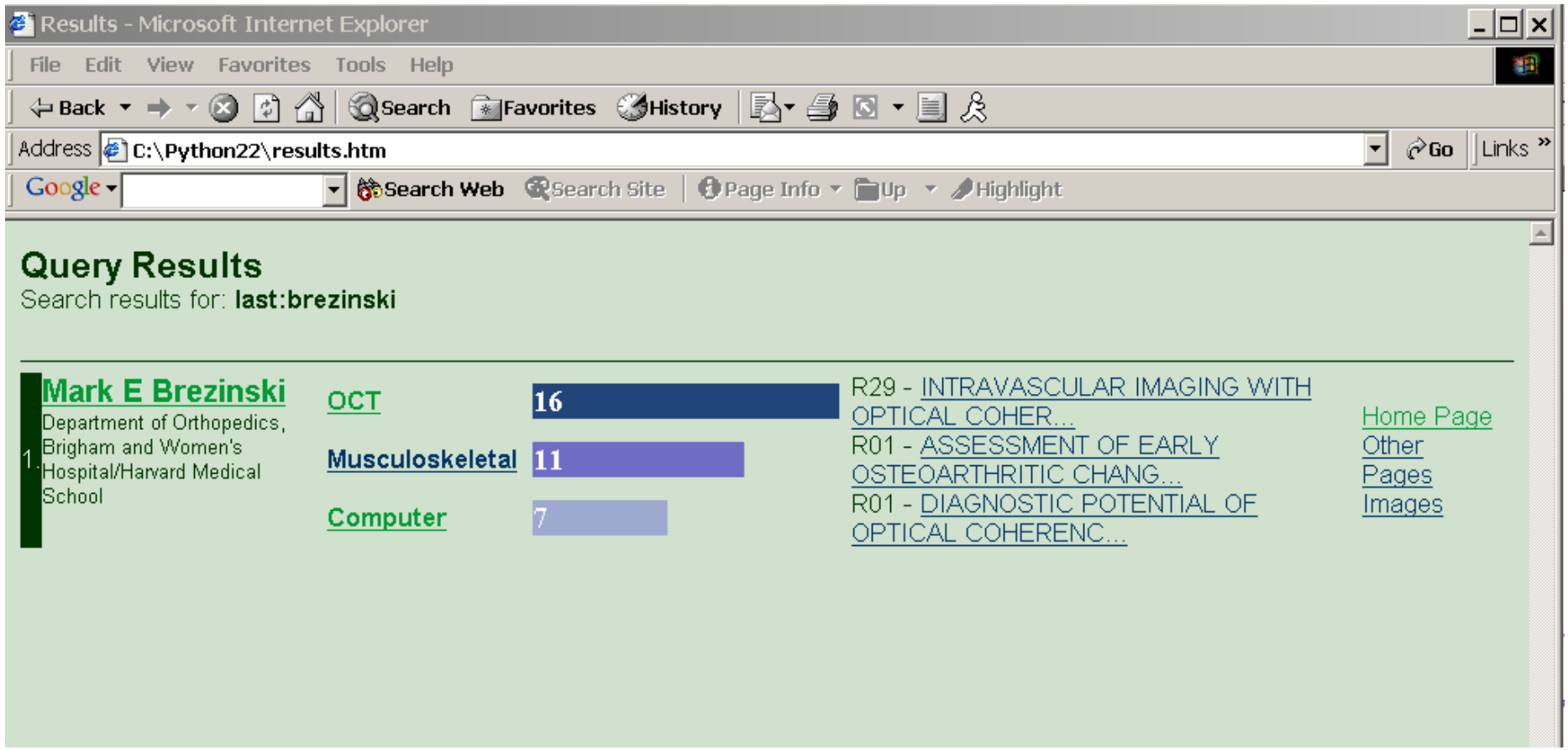
OPTICAL IMAGING
Transillumination
Spectrophotometry
Spectrometry, Fluorescence
Spectroscopy, Near-Infrared
Infrared spectrometry(CRISP)
Raman spectrometry(CRISP)
Luminescence
Spectrum Analysis, Raman
Microscopy, Confocal
Microscopy, Fluorescence
Microscopy, Interference
/
OCT
!Optical Coherence Tomography
!OCT
Optical Coherence Tomography(CRISP)
/
DOT
!DOT
!Diffuse Optical Tomography

Reviewer Search Example

```
>last:brezinski


There are 1 results.
Generating results.htm..
writing HTML file..
done.
------------------------------------------------------------------------------
Please choose one of the following options:
[1] Load info from PubMed XML file.      [2] Load info from CRISP files.
[3] Load database (overwrites current)   [4] Save Database (overwrites previous)
[5] Remap MESH and CRISP keywords       [6] Generate individual HTML pages
[7] Load XML/CRISP/Map/Generate HTML (overnighter) [8] Search Help     [9] Quit
[10] Perform optimization
*There are 17203 people in loaded database.*
   -964 of them have at least one CRISP article
------------------------------------------------------------------------------
>
```

Reviewer Brief Profile Page



Reviewer Full Profile Page

227

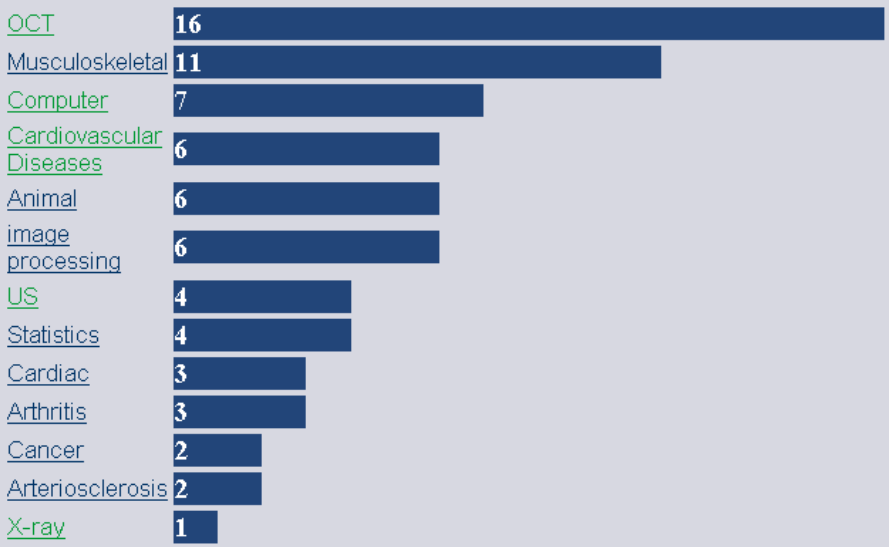
Mark E Brezinski
Department of Orthopedics, Brigham and Women's Hospital/Harvard Medical School

OCT	16
Musculoskeletal	11
Computer	7

R29 - INTRAVASCULAR IMAGING WITH OPTICAL COHER...
R01 - ASSESSMENT OF EARLY OSTEOARTHRITIC CHANG...
R01 - DIAGNOSTIC POTENTIAL OF OPTICAL COHERENC...

Home Page
Other Pages
Images

Full Profile:



Reviewer Full Profile Page/Continued

Crisp Info:

Awards

R29 - INTRAVASCULAR IMAGING WITH OPTICAL COHERENCE TOMOGRAPHY

R01 - ASSESSMENT OF EARLY OSTEOARTHRITIC CHANGES WITH OCT

R01 - DIAGNOSTIC POTENTIAL OF OPTICAL COHERENCE TOMOGRAPHY FOR

R01 - New Model for Assessing Cartilage Repair and Protection

R01 - Optical Coherence Tomography for Pulmonary Circulation

R01 - IMPROVING THE DIAGNOSTIC POTENTIAL OF OCT FOR VULNERABLE

R01 - Optical Coherence Tomography for Microsurgical Guidance

Email: mebrezin@mit.edu

Title: PROFESSOR

Reviewer Full Profile Page/ MESH Thesaurus Keyword List

Mesh Keyword List:

methods [30]
pathology [25]
Tomography [16]
radiography [15]
Support, U.S. Gov't, P.H.S. [12]
Support, Non-U.S. Gov't [9]
Human [8]
Support, U.S. Gov't, Non-P.H.S. [8]
Optics [7]
Animal [6]
Image Processing, Computer-Assisted [6]
instrumentation [4]
Cartilage, Articular [3]
Rabbits [3]
ultrasonography [3]
Ultrasonography, Interventional [3]
Osteoarthritis [3]
anatomy & histology [2]
Knee Joint [2]
Coronary Arteriosclerosis [2]

Reviewer Full Profile Page/Paper Abstracts

MEDLINE Article Abstracts:

Cartilage thickness measurements from optical coherence tomography.

By: Mark E Brezinski (ME)
from: Department of Orthopedics, Brigham and Women's Hospital/Harvard Medical School, 75 Francis Street, Boston, Massachusetts 02115, USA.
published in:J Opt Soc Am A Opt Image Sci Vis

We describe a new semiautomatic image processing method for detecting the cartilage boundaries in optical coherence tomography (OCT). In particular, we focus on rabbit cartilage since this is an important animal model for testing both chondroprotective agents and cartilage repair techniques. The novel boundary-detection system presented here consists of (1) an adaptive filtering technique for image enhancement and speckle reduction, (2) edge detection, and (3) edge linking by graph searching. The procedure requires several steps and can be automated. The quantitative measurements of cartilage thickness on OCT images correlated well with measurements from histology.

Characterizing arterial plaque with optical coherence tomography.

By: Mark Brezinski (M)
from: Department of Orthopedic Surgery, Brigham and Women's Hospital, Boston, MA, USA. mebrezin@mit.edu
published in: Curr Opin Cardiol

Many imaging technologies have been pivotal in the reduction of mortality associated with coronary artery disease over the last 50 years. However, there are several areas where coronary disease could benefit from high-resolution imaging. Recently, optical coherence tomography (OCT) has been introduced for micron scale intravascular imaging. OCT is analogous to ultrasonography, measuring the intensity of back-reflected infrared light rather than sound. First, its resolution, at 4 to 20 microm, is higher than that of any currently available imaging technology. Second, acquisition rates are near video speed. Third, unlike ultrasonography, OCT catheters consist of simple fiber optics and contain no transducers within their frame. This makes imaging catheters both inexpensive and small, the current smallest cross-sectional diameter being 0.014 inches. Fourth, OCT systems are compact and portable. Finally, it can be combined with a range of spectroscopic techniques. This article reviews the application of OCT to intracoronary imaging.

Reviewer Full Profile Page/CRISP Record Link

Abstract

Back to Hit List

Grant Number: 5R29HL055686-02
PI Name: BREZINSKI, MARK E.
PI Email: mebrezin@mit.edu
PI Title: PROFESSOR
Project Title: INTRAVASCULAR IMAGING WITH OPTICAL COHERENCE TOMOGRAPHY

Abstract: *DESCRIPTION (Adapted from Applicant's Abstract): The goal of this research is to develop a new method of intravascular* ***imaging****, which has the possibility of identifying atherosclerotic lesions. The lesions would then be characterized as to their potential for progression to alteration or rupture. The possibility of identifying and discriminating those lesions which are at risk for rupture has great significance. The applicants proposed to use optical coherence tomography (OCT) to develop a high resolution intravascular* ***imaging*** *system for the diagnosis of atherosclerotic lesions. The applicants noted the analogy of OCT to B Mode* ***ultrasound imaging****. However, the use of infrared light rather than acoustical waves should provide high resolution, broad dynamic range, and easy integration into cardiovascular catheter systems. The principal focus of this application is the development of background feasibility experiments designed to assess the feasibility of this approach. These background experiments focus on identifying advantages and limitations of OCT for intravascular* ***imaging*** *and maximizing performance. The specific aims are: 1) To perform* ***imaging*** *on a wide range of plaque morphologies and vascular components; 2) To determine the limitations associated with* ***imaging*** *through whole blood; 3) To identify the optimal incident wavelength for OCT* ***imaging*** *of the vasculature; 4) To directly compare the ability of both OCT and high frequency* ***ultrasound*** *(IVUS) to assess micropathology within human atherosclerotic plague in virtu; and 5) To demonstrate the ability of OCT and IVUS to perform in vivo* ***imaging*** *of an intravascular stent within a rabbit aorta.*

Assignment Optimization Program Parameters

$$Score\ Function\ (A_i, R_j) = C_1 \cdot w_1^{k_1} + C_2 \cdot w_2^{k_2} + \ldots + C_n \cdot w_n^{k_n}$$

$C_1, C_2, \ldots C_n$ – *constants to provide relative weights for topic areas*;

$w_1, w_2, \ldots, w_n$ – *weights associated with application topic areas*;

$k_1, k_2, \ldots, k_n$ – *integers representing the number of matches with reviewer expertise.*

Score Function → max, # of reviewers, # of assignments per reviewer → min

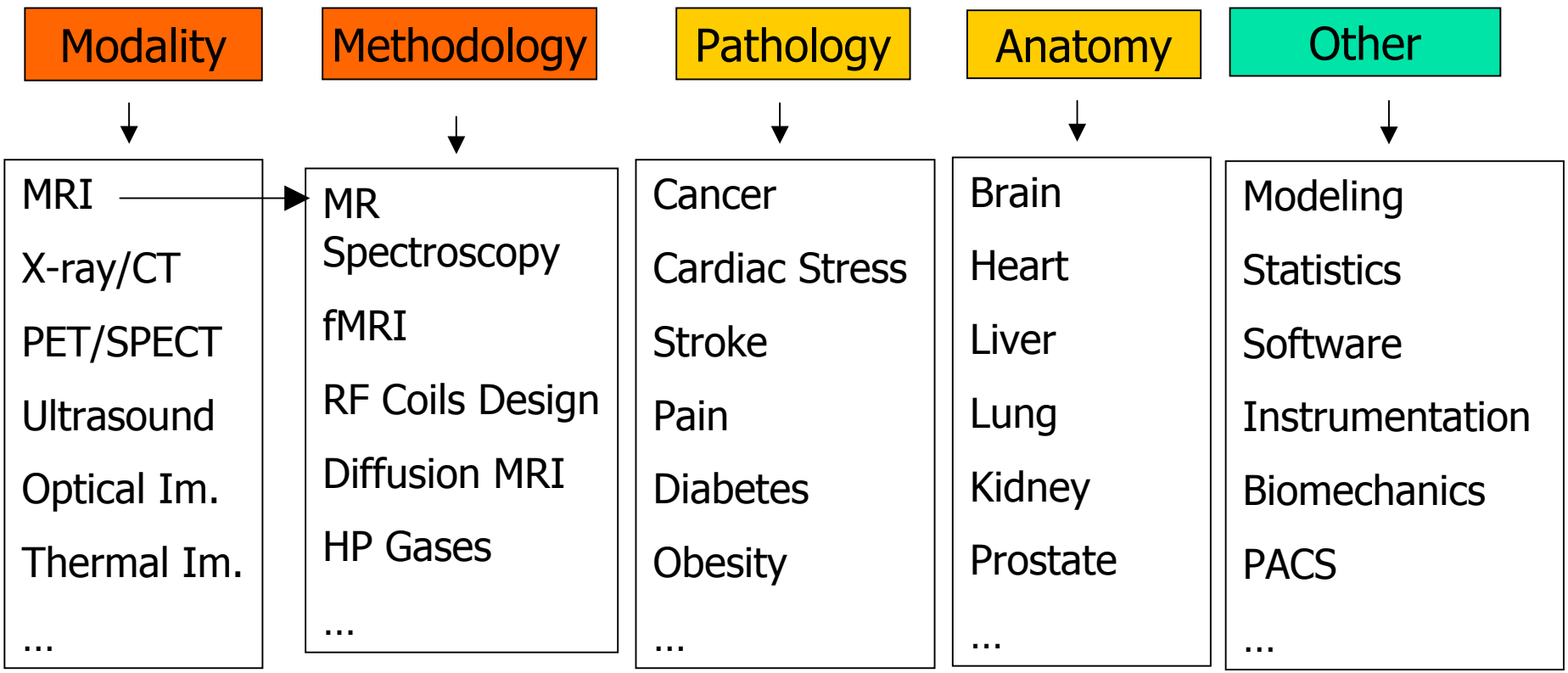
Other factors to include in reviewer assignments: diversity/gender/geographical balance, conflicts of interest, # of phone/mail reviewers, etc.

Assignment Optimization Results

Application #	Reviewer1	Reviewer2	Reviewer3	Reviewer4	Reviewer5
A 1	R 39	R 12	R 1		
A 2	R 22	R 13	R 26		
A 3	R 33	R 4	R 13		
A 4	R 13	R 6	R 29		
A 5	R 28	R 21	R 4		
A 6	R 2	R 16	R 22		
A 7	R 9	R 12	R 33		
A 8	R 12	R 33	R 7		
A 9	R 18	R 23	R 37		
A 10	R 1	R 12	R 33		

▪ ▪ ▪

Future Modifications/Keyword Categories



Download XML Data from Other MESH Branches

Computer:

Computing Methodologies
- -Algorithms
- -Artificial Intelligence
- - -Expert Systems
- - -Fuzzy Logic
- - -Natural Language Processing
- - -Neural Networks (Computer)
- - -Robotics
- -Automatic Data Processing
- - -Punched-Card Systems
- -Computer Graphics
- - -Computer-Aided Design
- -Computer Simulation
- -Computers, Molecular
- -Image Processing, Computer-Assisted
- - -Image Enhancement
- - - -Radiographic Image Enhancement
- - - -Radiography, Dual-Energy Scanned Projection
- -Mathematical Computing
- - -Decision Support Techniques
- - - -Data Interpretation, Statistical
- - - -Decision Theory
- - - -Decision Trees
- - - -Neural Networks (Computer)
- - -Numerical Analysis, Computer-Assisted
- -Signal Processing, Computer-Assisted