

Call for Papers
IEEE Journal of Selected Topics in Signal Processing
Special Issue on Domain Enriched Learning for Medical Imaging

In recent years, learning based methods have emerged to complement traditional model and feature based methods for a variety of medical imaging problems such as image formation, classification and segmentation, quality enhancement etc. In the case of deep neural networks, many solutions have achieved unprecedented performance gains and have defined a new state of the art. Despite the progress, compelling open challenges remain. One such key challenge is that many learning frameworks (notably deep learning) are purely data-driven approaches and their performance depends strongly on the quantity and quality of training image data available. When training is limited or noisy, the performance drops sharply. Deep neural networks based approaches additionally face the challenge of often not being straightforward to interpret. Fortunately, exciting recent progress has emerged in enriching learning frameworks with domain knowledge and signal structure. As a couple of representative examples: in image reconstruction problems, this may involve using statistical/structural image priors; for image segmentation, shape and anatomical knowledge (conveyed by an expert) may be leveraged, etc. This special issue invites original new contributions that combine signal, image priors and other flavors of domain knowledge with machine learning methods for solving medical imaging problems. Topics of interest include but are not limited to:

- Fundamental innovations in combining model based and learning based methods.
- Sparse representation and dictionary learning based methods for medical image processing and understanding.
- Domain enriched and regularized deep learning via special network architectures and systematic integration of problem specific insights.
- Interpretable deep networks for medical imaging via techniques such as algorithm unrolling.
- Algorithmic methods that gracefully degrade with amount of training image data available and enable robustness against selection bias.
- Example applications include image reconstruction and formation, medical image classification and segmentation, image understanding, boundary and shape analysis, registration, quality enhancement etc. The scope encompasses all medical imaging modalities including but not limited to MRI, X-Ray, CT, PET, ultrasound, photoacoustic imaging, various forms of microscopy, multispectral imaging, new and emerging imaging techniques and modalities.

Important Dates:

Manuscript Submission Due:	December 15, 2019 (Extended)
First Review Completed:	February 15, 2020
Revised Manuscript Due:	April 01, 2020
Second Review Completed:	June 01, 2020
Final Manuscript Due:	July 15, 2020

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