Computational and Mathematical Methods in Medicine

Hindawi

Special Issue on

Machine Learning Applications in Medical Image Analysis

CALL FOR PAPERS

Machine learning is one of the major tools of medical image analysis for today's computer-aided diagnosis (CAD). Prior knowledge, learned from characteristic examples provided by medical experts, helps to guide image registration, fusion, segmentation, and other analyzing steps towards describing accurately the initial data and CAD goals and extracting reliable diagnostic cues. For example, quantitative 3D shape analyses of the corpus callosum on brain MRI help in diagnosing autism or dyslexia.

Although the CAD systems employ many promising and efficient learning techniques, recent neuroimaging advances in functional and structural magnetic resonance imaging (MRI), such as, for example, diffusion-weighted MRI and other modalities for visualizing brain and nervous system, call for both enhancing known traditional learning methods and applying new prospective ones (such as, e.g., deep learning of multilayer convolutional neural networks or high-order Markov random field models to predict states of a brain).

This issue focuses on both avenues of the use of machine learning in medical image analysis. Researchers are invited to contribute original research articles and / or reviews stimulating current permanent efforts to solve these important problems.

Potential topics include but are not limited to the following:

- Thoracic imaging: developing CAD systems for lung images acquired from different modalities such as computed tomography (CT) and MRI. These CAD systems include lung segmentation, registration, and nodule segmentation detection.
- Abdominal imaging: developing CAD systems for the diagnosis of abnormalities from different organs, such as the kidney, the liver, the colon, and the prostate. The images for such organs are acquired using a wide variety of imaging modalities such as CT, MRI, and ultrasound.
- Brain imaging: developing CAD systems for the diagnosis of several abnormalities from images acquired form different modalities such as MRI. Such abnormalities include but are not limited to autism, dyslexia, epilepsy, and Parkinson's disease.
- Retinal imaging: developing CAD system for diagnosis of retinal abnormalities from optical coherence tomography (OCT) images. These CAD systems include the segmentation of multiple retinal layers, followed by detecting early subtle changes for the diagnosis of disorders such as diabetes and macular degeneration.

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