Title: **Deep reinforcement learning for medical image analysis**

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Abstract: Deep neural networks are increasingly applied for automated medical image analysis. Yet, recent advances in imaging technologies enable medical images, like MRI scans, to be acquired at incredibly high "gigapixel" resolutions. This makes it computationally infeasible to analyze these images entirely at high resolution. Moreover, when scanning people with neurological disorders diagnostic labels are largely available only at the scan-level, because expert annotation of images at a finer (voxel) level is prohibitively laborious and expensive. In addition, regions with diagnostic information typically occupy only a small fraction of the scan, making it inefficient to examine the entire scan at full resolution. In this project, we will develop state-of-the-art deep reinforcement learning (Deep RL) models for efficient analysis of high-resolution images, acquired with modalities like MRI or CT or EEG. We will employ cutting-edge advances in deep learning, such as multiple instance learning (MIL) along with a deep RL agent that samples intelligently and zooms selectively into small portions of the at image high-resolution. This will enable reliable imaging-based disease diagnosis a fraction of their computational and memory costs of conventional models. The overarching goal is to develop intelligent sampling model for medical imaging challenges that involve automated diagnosis with exceptionally large images containing sparsely informative features.

References:

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