Please accept this submission in response to your invitation:

On behalf of the National Institutes of Health (NIH) BD2K program, we are inviting you to participate in the upcoming annual International Society for Computational Biology meeting, ISMB 2018 in Chicago, IL. BD2K will be hosting several exciting sessions on July 7th-8th, highlighting talks from NIH officials around biomedical data science, BD2K projects, and training programs. Example sessions will include:

* BD2K Power Tools: Faster, Cheaper, Better
* Building the FAIR Data Ecosystem from the Ground Up
* Advancing Biomedical Sciences through Machine Learning

**Affiliated BD2K Project:** Automatic discovery and processing of EEG cohorts from clinical records

**BD2K Grant Number:** U01HG008468

**Letter of Support:** PIs Obeid and Picone are co-PIs on this project and co-authors on this submission.

**Abstract:**

**Automated Interpretation of Abnormal Adult Electroencephalograms**

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Interpretation of electroencephalograms (EEGs) is a process that is dependent on the subjective analysis of the examiner and has low interrater agreement. As a first step for EEG analysis, neurologists categorize the signals as normal or abnormal. In this investigation, we explore the hypothesis that high performance automatic classification of an EEG signal as abnormal can approach human performance by examining the first few minutes of an EEG recording. This study establishes a baseline for automated classification of abnormal adult EEGs using machine learning and a big data resource – The TUH EEG Corpus. A demographically balanced subset of the corpus was used to evaluate performance of the systems. The data was partitioned into training (1,387 normal and 1,398 abnormal files) and evaluation (150 normal and 130 abnormal files) sets.

We compared the performance of several well-established technologies: hidden Markov Models (HMMs) (26.1% error rate), an HMM with a Stacked Denoising Autoencoder (HMM-SdA) (24.6%) and a deep learning system that combined a Convolutional Neural Network with a Multilayer Perceptron (CNN-MLP) (21.2%). We have established an experimental paradigm that can be used to explore this application and have demonstrated a promising baseline using state of the art deep learning technology.

Keywords: electroencephalogram (EEG), abnormal, deep learning