TITLE

The Next Quantum Leap? Using Big Data Resources to Drive Clinical Neurology and Neuroscience Research

ABSTRACT

The confluence of four important factors is presenting an unprecedented opportunity for advancing both applied clinical medicine and basic biomedical research. These factors are (1) inexpensive parallel-processor supercomputing (2) inexpensive data storage (3) increasingly powerful deep-learning techniques and (4) massive numbers of digitized medical records. The combination of these elements has the potential to allow engineers to draw previously undetectable statistical inferences that can eventually help clinicians diagnose and plan treatments.

Despite the profound research opportunity, big biomedical data resources remain scarce. Reasons include a lack of standardized methodologies for recording and archiving clinical data, as well as the difficulty in parsing the physician notes that give the data the necessary clinical context.

This talk will discuss efforts at Temple University to overcome these and other issues in our creation of the TUH EEG Corpus. This archive comprises over 25,000 archival clinical EEG records recorded at Temple University Hospital from some 15,000 unique patients over the past decade. In addition to the raw EEG signals, this corpus includes EEG reports that contain medical histories and clinical diagnoses. This dataset is sufficiently large and varied to allow the use of some powerful machine learning methods to predict EEG events are critical to the interpretation of an EEG (e.g., spikes and generalized periodic epileptiform discharges). We will discuss our ongoing research to use this corpus to develop technology to automatically interpret EEGs.

BIO

Dr. Iyad Obeid is an Associate Professor of Electrical and Computer Engineering and Bioengineering at Temple University in Philadelphia, PA. His research focuses on neural instrumentation, neural interfaces, and neural signal processing. He holds a doctorate in Biomedical Engineering from Duke University and is an NSF CAREER awardee.

Dr. Joseph Picone is a Professor of Electrical and Computer Engineering at Temple University. His primary research interests are machine learning approaches to signal processing with applications in EEG analysis and speech recognition. For over 30 years, his research group has been known for producing many innovative open source materials for signal processing including a public domain speech recognition system (see *[www.isip.piconepress.com](http://www.isip.piconepress.com/%22%20%5Ct%20%22_blank)*). He received a Ph.D. in Electrical Engineering in 1983 from the Illinois Institute of Technology, is currently a Senior Member of the IEEE, and has published extensively in the area of human language technology.