|  |
| --- |
| Shape  Description automatically generated with low confidence**Doctoral Dissertation Defense Presentation**Department of Electrical and Computer Engineering**Wednesday, May 19, 2021****1:00 PM****Zoom Video Conference** |
| **Improved Segmentation for Automated Seizure Detection using Channel-dependent Posteriors****Vinit Shah****Electrical Engineering**Committee:Dr. Joseph Picone, ECEDr. Iyad Obeid, ECEDr. Yimin Zhang, ECEDr. Pallavi Chitturi, Department of StatisticsDr. Mercedes Jacobson, Department of NeurologyDr. Georgios Lazarou, External Reader**Abstract:**The electroencephalogram (EEG) is the primary tool used for the diagnosis of a variety of neural pathologies such as epilepsy. Identification of a critical event, such as an epileptic seizure, is difficult because the signals are collected by transducing extremely low voltages, and as a result, are corrupted by noise. Also, EEG signals often contain artifacts due to clinical phenomena such as patient movement. These artifacts are easily confused as seizure events. Factors such as slowly evolving morphologies make accurate marking of the onset and offset of a seizure event difficult. Precise segmentation, defined as the ability to detect start and stop times within a fraction of a second, is a challenging research problem. In this dissertation, we improve seizure segmentation performance by developing deep learning technology that mimics the human interpretation process. | The central thesis of this work is that separation of the seizure detection problem into a two-phase problem – epileptiform activity detection followed by seizure detection – improves our ability to detect and localize seizure events. In the first phase, we use a long short-term memory (LSTM) network to identify channel-specific epileptiform discharges. In the second phase, the feature vector is augmented with posteriors that represent the endpoints of ictal activities. These augmented features are applied to a multichannel convolutional neural network (CNN) followed by an LSTM network.The multiphase model was evaluated on a blind evaluation set and was shown to detect $106$ segment boundaries within a $2$-second margin of error. Our multiphase system was also shown to be robust by performing well on two blind evaluation sets. Improving seizure detection performance through better segmentation is an important step forward in making automated seizure detection systems clinically acceptable.**Zoom Meeting Info:**<https://temple.zoom.us/j/94487317144>Meeting ID: 944 8731 7144One tap mobile:+13017158592,,94487317144# US (DC)+19292056099,,94487317144# US (NY) |