

Predict seizures in EEG recordings

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1 Overview and Goal

Epilepsy afflicts nearly 1% of the world's population, and is characterized by the occurrence of spontaneous seizures [1, 2]. Seizure forecasting systems have the potential to help patients with epilepsy lead more normal lives. In order for EEG-based seizure forecasting systems to work effectively, computational algorithms must reliably identify periods of increased probability of seizure occurrence. If these seizure-permissive brain states can be identified, devices designed to warn patients of impending seizures would be possible. Patients could avoid potentially dangerous activities like driving or swimming, and medications could be administered only when needed to prevent impending seizures, reducing overall side effects.

In 2014 and 2016 Kaggle completed two seizure prediction challenges [3]. The first challenge [1] primarily involved long-term electrical brain activity recordings from dogs. The second challenge [2] focuses on seizure prediction using long-term electrical brain activity recordings from humans obtained from the world-first clinical trial of the implantable NeuroVista Seizure Advisory System. In this project you will apply and compare different methods on the EEG data obtained from both Kaggle challenges. The responsible student will:

- Survey time series classification techniques
- Apply existing techniques on the EEG data
- Analyze the performance of these techniques

2 Required Skills

The student should have knowledge in Machine learning. The student should know how to work with some programming language for machine learning (for example Matlab or Python).

References

- [1] “Predict seizures in intracranial eeg recordings,” accessed: 3 October 2016. [Online]. Available: <https://www.kaggle.com/c/seizure-prediction>
- [2] “Predict seizures in long-term human intracranial eeg recordings,” accessed: 3 October 2016. [Online]. Available: <https://www.kaggle.com/c/melbourne-university-seizure-prediction/>
- [3] “Reviewing the american epilepsy society seizure prediction challenge,” accessed: 3 October 2016. [Online]. Available: <http://blog.kaggle.com/2015/01/26/american-epilepsy-society-seizure-prediction-challenge/>