Getting to grips with seizure prediction

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A device that could predict when a person with epilepsy might next have a seizure is one step closer to reality thanks to the development of software by researchers in the USA. Details are to be published in a forthcoming issue of the *International Journal of Data Mining and Bioinformatics.*

Seizure prediction is an important medical aim for the many people who suffer from epilepsy and related neurological disorders. Medication is available for controlling seizures but a way to determine in advance when an attack might occur would allow sufferers to live a normal life safe, drive vehicles and operate hazardous machinery etc, safe in the knowledge that they will know when a seizure is about to occur and they can move out of harm's way in plenty of time.

Shouyi Wang of the Department of Industrial and Manufacturing Systems Engineering, at University of Texas at Arlington, Arlington, TX, and Wanpracha Art Chaovalitwongse of the University of Washington, Seattle and Stephen Wong of the University of Medicine and Dentistry of New Jersey, in New Brunswick, explain that current epileptic seizure prediction algorithms require much prior knowledge of a patient's pre-seizure electroencephalogram (EEG) patterns. This usually makes them entirely impractical as pre-seizure EEGs are rarely available in the requisite detail or number.

The team has now developed software that can learn about the patient's normal and seizure electrical activity from long-term EEG recordings after diagnosis. The learning process then allows the software to predict when another seizure may occur based on the learned patterns. Ultimately, a portable device with discrete electrodes, perhaps worn under a cap or hat would utilize this algorithm to give the patient an early warning of an imminent seizure. This would allow them to pull over safely if driving or otherwise move out of hazardous situation and into a safe environment well before the seizure begins.

"Our experimental results showed that the adaptive prediction scheme could achieve a consistent better prediction performance than a chance model and the non-updating system," the team says. "This study confirmed that the concept of using adaptive learning algorithms to improve the adaptability of seizure prediction is conceivable," the researchers add. "If a seizure-warning device is ever to become a reality, adaptive learning techniques will play an important role."

More information: "A gradient-based adaptive learning framework for online seisure prediction," International Journal of Data Mining and Bioinformatics, in 2014, 10, 49-64

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