

## **Crowdsourcing Advances Epileptic Seizure Detection and Prediction** *504 Global Teams Compete in Model of Collaborative Research*

Embargoed for release until December 5, 2014 2:00 PM PT / 5:00 PM ET

**SEATTLE**, December 5, 2014 – An international competition using the wisdom of crowds has developed computer algorithms to detect, predict, and ultimately prevent epileptic seizures. A total of five-hundred and four teams competed in two challenges, one for Seizure Detection and a second for Seizure Prediction. – The contests were hosted by Kaggle, an online platform featuring open competitions for predictive modeling, with participants from all over the world and diverse backgrounds in data analytics, including industry, academia, and hobbyists.

The two challenges were sponsored by the American Epilepsy Society (AES), the National Institutes of Health's National Institute of Neurological Disorders and Stroke (NINDS) and the Epilepsy Foundation. They set forth goals of accurately detecting and predicting seizure activity in electrical recordings from the brains of individuals with epilepsy and from dogs with spontaneously occurring seizures. Winners are to be announced on December 6th at the AES 68th Annual Meeting in Seattle during the Presidential Symposium. The competitions were developed and organized by Dr. Ben Brinkmann of the Epilepsy and Neurophysiology Laboratory at the Mayo Clinic (Rochester, Minnesota), along with data scientists at Kaggle. They used shared datasets from the International Epilepsy Electrophysiology Portal (<http://ieeg.org>), an NINDS-funded platform for collaborative research, data and algorithm sharing in the neurosciences run by Drs. Zack Ives and Joost Wagenaar at the University of Pennsylvania.

"This is an incredibly dynamic and powerful way to do community research and bring new minds into the challenge of epilepsy," said Brian Litt, M.D., co-chair of competition, Professor of Neurology and Bioengineering at the University of Pennsylvania and Director of Penn's Center for Neuroengineering and Therapeutics. "Before this, after 15 years of research, it was only last year that investigators were able to publish seizure prediction better than random. As a result of the contests, in just a few months, teams with no expertise in epilepsy were consistently getting performance as high as 84%. In addition, anyone with a computer is able to see what the teams did and can try to improve on their results," he said.

The first contest – the Seizure Detection Challenge – was won by Michael Hills, an Australian software engineer. In this phase contestants were charged with analyzing retrospective prolonged intracranial EEG data recorded from four dogs with naturally occurring epilepsy and from eight individuals with medication-resistant seizures during evaluation for epilepsy surgery.

The second contest - the Seizure Prediction Challenge - was a tight seven-way race with top finishers scoring just .05 percentage points from each another. The first place is being awarded to a team of five engineers and scientists who mutually decided to merge efforts midway through the contest. Drew Abbot, an engineer and Philip Adkins, a mathematician, work at a small company in Sunnyvale, CA called AiLive. Quang Tien Ph.D., Simone Bosshard Ph.D., and Min Chen Ph.D. are scientists at the University of Queensland in Australia. They work in the Center for Advanced Imaging led by David Reutens, MBBS M.D. In this phase, teams were challenged to predict seizures accurately from a mixed data set shared from intracranial recordings from humans and dogs with epilepsy. This team predicted seizures with an accuracy of 82%.

The software and strategies are already being shared openly online by the contest participants, and the unique datasets developed for the competition are being made freely available to researchers worldwide by NINDS, University of Pennsylvania and Mayo Clinic to advance epilepsy research and treatment.

“Advances in neuroengineering have led to 1<sup>st</sup> generation implantable devices to treat epilepsy. However, improved therapeutic efficacy is needed. Computational advances providing more accurate seizure detection and prediction are poised to improve therapy,” says Gregory Worrell, M.D., Ph.D., co-chair of the AES Presidential Symposium, Professor of Neurology, Biomedical Engineering and Physiology at the Mayo Clinic. “The model of sharing data and algorithms is critical for generating reproducible research, and will rapidly accelerate science. Crowd sourced competitions are an important step in making these devices better.”

“Nearly one person in twenty six suffers from epilepsy worldwide, and approximately one third of these individuals have ongoing seizures that are not sufficiently treated with medications or other therapies. New medical devices for preventing seizures are being developed that can utilize the algorithms and strategies used in the seizure detection and prediction challenges.,” says Edmund Talley, Ph.D., NINDS Program Director. “The competitions take a new approach that leverages the expertise of communities outside neurology. It is an approach that could be used to understand and treat disorders beyond epilepsy.”

**Editor’s Note:** Dr. Elson So, Dr. Gregory Worrell and Dr. Brian Litt will be available at a press briefing on **December 5, 2014 at 2:00 PM (PT)/ 5:00 PM (ET)**, in the onsite press room, Room 304, Level 3 of the Washington State Convention Center. The call-in number for off-site journalists is 1-605-475-4000, passcode 521653#.

#### **About the American Epilepsy Society**

The American Epilepsy Society (AES) is a non-profit medical and scientific society. Our individual members are professionals engaged in both research and clinical care for people with epilepsy from private practice, academia and government. For more than 75 years, AES has been unlocking the potential of the clinical and research community by creating a dynamic global forum where professionals can share, learn and grow. AES champions the use of sound science and clinical care through the exchange of knowledge, by providing education and by furthering the advancement of the profession.

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