Personalized Neuromodulation Optimization

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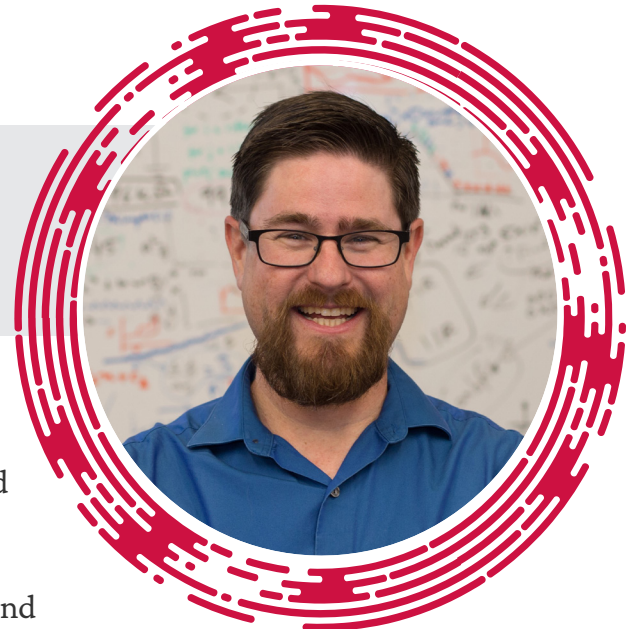
Neuromodulation is used to treat many disorders such as epilepsy, depression, chronic pain, and spinal cord injury. Implantable devices that deliver stimulation can be programmed to change stimulation amplitude, frequency, pulseswidth, and electrode selection to tune the stimulation. While this provides the opportunity to tune a device to a patient's particular needs and personalize the therapy, the stimulator can provide billions of possible parameters. We have adapted Bayesian optimization to model how therapeutic benefits change with stimulation parameters based on patient feedback and to suggest settings for testing to explore and exploit the stimulation parameter space. I will show clinical examples of how we have used optimization for spinal cord stimulation for the treatment of spinal cord injury to restore volitional control, deep brain stimulation for treatment of epilepsy, and cortical stimulation for treatment of depression.

ABOUT the SPEAKER

Theoden (Tay) Netoff is a professor of Biomedical Engineering at the University of Minnesota. He is trained as a patch-clamp electrophysiolgist and has studied basic mechanisms of epilepsy. More recently, his lab has collaborated with clinicians to optimize neuromodulation therapies to improve outcomes. He is the Co-director of the Center for Neuroengineering at the University of Minnesota and organizes the Annual Minnesota Neuromodulation Symposium. He is also the director of the Minnesota Neuroimaging Postdoctoral T32 Fellowship.

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