Docket #: S13-175

A brain-machine interface utilizing interventions on dimensionality-reduced data

Stanford researchers have discovered an algorithm that significantly increases the performance of poorly performing brain machine interfaces (BMIs). This novel algorithm has two major innovations. Firstly, it utilizes an intervention on the Kalman filter observation noise to re-weight certain neural observations. When the neural observations are, for example, low-dimensional neural trajectories as found via principal component analysis, the intervention can be used to ameliorate directional biases in the decoder by deweighting principal components that have less information about the directional control of the prosthetic device. Secondly, the algorithm may utilize prior information on the dimensionality of the space in which the neural data is projected into. For example, if the space was better sampled when more neurons were previously observed, that space can be remembered; then, in experiments where far fewer neurons are observed, these neurons can be noisily projected into the remembered space.

Stanford researchers develop brain-controlled typing for people with paralysis.

Applications

- This algorithm serves to increase the performance of poorly performing BMIs.

Advantages

- This algorithm can "save" poorly performing BMIs, increasing their performance to higher levels.

Publications

- Yu BM, Cunningham JP, Santhanam G, Ryu SI, Shenoy KV, Sahani M, "Gaussian-process factor analysis for low-dimensional single-trial analysis of neural population activity". *Journal of Neurophysiology*, 102:614-635, March 24, 2009.
- "Stanford researchers reveal more about how our brains control our arms". *Stanford Report*, January 28, 2014.

Patents

- Issued: 9,471,870 (USA)

Innovators

- Jonathan Kao
- Chethan Pandarinath
- Paul Nuyujukian
- Krishna Shenoy

Licensing Contact

Imelda Oropeza

Senior Licensing Manager, Physcial Sciences

Email