

Title: Decoding Kinematics from Human Parietal Cortex using Neural Networks

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Abstract: Brain-machine interfaces have shown promising results in providing control over assistive devices for paralyzed patients. In this work we describe a BMI system using electrodes implanted in the parietal lobe of a tetraplegic subject. Neural data used for the decoding was recorded in five 3-minute blocks during the same session. Within each block, the subject uses motor imagery to control a cursor in a 2D center-out task. We compare performance for four different algorithms: Kalman filter, a two-layer Deep Neural Network (DNN), a Recurrent Neural Network (RNN) with SimpleRNN unit cell (SimpleRNN), and a RNN with Long-Short-Term Memory (LSTM) unit cell. The decoders achieved Pearson Correlation Coefficients of 0.48, 0.39, 0.77 and 0.75, respectively, in the Y-coordinate, and 0.24, 0.20, 0.46 and 0.47, respectively, in the X-coordinate.