Title: Deep Multi-state Dynamic Recurrent Neural Network with Scheduled Sampling: Theory and Application in Robust Brain Machine Interfaces

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Abstract: In this study we present a new deep multi-state Dynamic Recurrent Neural Network (DRNN) architecture to better perform regression. The DRNN is used for predicting Cartesian representation of kinematics from the neural data recorded from the Posterior Parietal Cortex of a human subject in a Brain Machine Interface (BMI) system. We pass a history of neuronal firing rates and feed the previous predictions back to the input of the system by using scheduled sampling. We design the algorithm to achieve a reasonable trade-off between performance, robustness, and hardware cost. We then compare our algorithm with the state-of-the-art methods in the literature to show that it performs favorably in terms of correlation coefficient (CC) and root mean square error (RMSE). The results show that multi-state DRNN with scheduled sampling is an effective and reliable decoder for BMIs.