

Supplementary information for “Data augmentation based on dynamical systems for the classification of brain states”

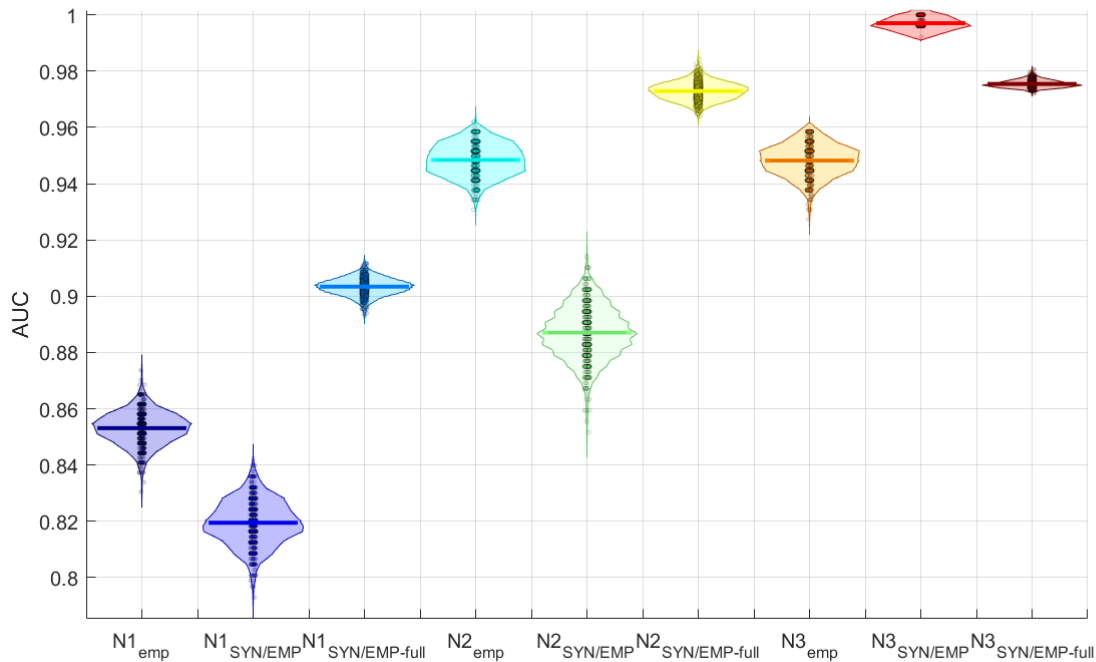


Figure S1: The distribution of AUC values for 1000 classifiers of each sleep stage vs. wakefulness (assessed via a cross validation procedure). For each sleep stage three different models were trained: 1) $N1_{emp}$, $N2_{emp}$ and $N3_{emp}$ stand for the classifier trained only with empirical data (16 empirical samples per state). 2) $N1_{SYN/emp}$, $N2_{SYN/emp}$ and $N3_{SYN/emp}$ correspond to classifiers trained with a combination of 7 empirical samples and 8 synthetic samples. 3) $N1_{SYN/emp-full}$, $N2_{SYN/emp-full}$ and $N3_{SYN/emp-full}$ correspond to classifiers trained with a combination of all available empirical samples (16 elements) and the same amount of synthetic data (data augmentation). The performance for the different training datasets presents different behavior across sleep stages. For N1 and N2 sleep, the full combined data set presents the best overall AUC, while for N3 sleep the best accuracy corresponds to the model trained with 15 combined elements; nevertheless, the mean AUC values are close to 1 for all three models trained to distinguish N3 sleep from wakefulness.

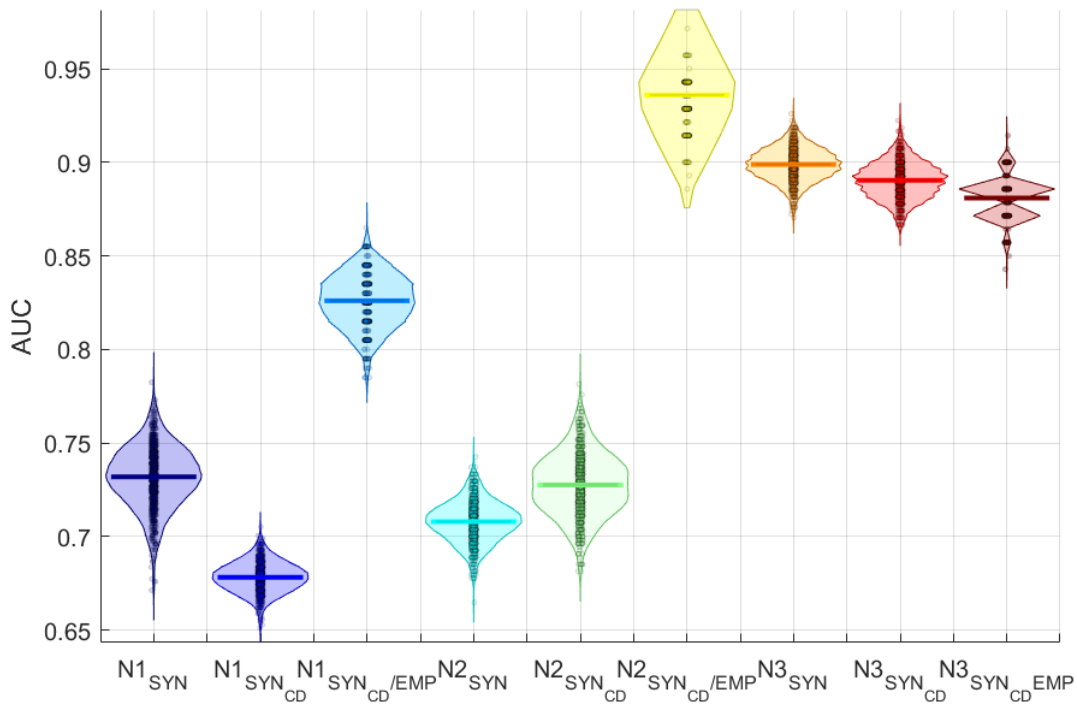


Figure S2: The AUC distribution for transfer learning to empirical data, computed for 1000 classifiers and displayed for each sleep state and for three different trained models. 1) $N1_{SYN}$, $N2_{SYN}$ and $N3_{SYN}$, represent models trained using synthetic data from the dynamical model without the *ad hoc* inclusion in structural connectivity (SC) contradiagonal (i.e. the same results showed in Fig.4). 2) $N1_{SYN-CD}$, $N2_{SYN-CD}$ and $N3_{SYN-CD}$, stand for the models trained using synthetic data with the *ad hoc* inclusion in the SC contradiagonal. 3) $N1_{SYN-CD/emp}$, $N2_{SYN-CD/emp}$ and $N3_{SYN-CD/emp}$, represent models trained using an equal amount of synthetic data with the *ad hoc* SC contradiagonal inclusion and empirical data (the empirical data used in the testing set was excluded for the training set). The *ad hoc* inclusion of the contradiagonal values did not improve transfer learning to empirical data. The transfer learning to empirical data using models that were trained with a combination of empirical and synthetic data improved for N1 and N2 sleep.