**BMI meeting 1**

1 March 2021

Alex, Leire, Josh, Enrico (GTA)\*

\*Wenli was sick

**Conclusion:**

In the next 2 weeks:

1. Implement ECOC, classification tree and random forest
2. Use mean trajectory to predict (x, y) arm coordinates
3. Write code in given file (*continuousEstimator0.m*)
4. Run code through submission file (*testFunction\_for\_students\_MTb.m*)

Next meeting: 8 March 2021

* Update each other on progress made
* Discussion of what worked and what didn’t
* Suggestion of new ideas

1. **Allowed methods?**

Everything/anything. We can either (i) Predict which class it belongs to, and then predict the details of the arm movement in a second model, or (ii) Build a regression model that directly predicts the details of the arm movement

1. **How is our model trained and tested?**

Look at the file called ‘*testFunction\_for\_students\_MTb.m*’. The model is trained on the training data. It is then tested by inputting the test data in 20ms intervals.

1. **Should we normalise arm position such that it starts from origin?**

* Play around with it
* Data comes from motor cortex which deals with movement and thus, “only” movement is encoded and there is no information about position
* BUT because we live in a messy world, data leaks from one part of the brain to another
* So there is some information about position from the motor cortex
* We can also predict the initial position from the neural spike data that we have
* But consider whether the benefits are large enough to justify this
* OR can find the mean initial position and just work with that
* Also consider working with movement rather than arm coordinates (i.e. delta x, delta y and delta z)
* Removes dependence on initial position

1. **Neural Network architectures mentioned:**

* Recurrent neural network (RNN): suitable for time series data. Has memory so can predict movement of next position based on past movements
  + Long short-term memory RNN
* Convolutional neural network (CNN): typically used for images
* BUT the GTA seems to not want us to use a NN so early on (possibly because we cannot justify it)

1. **Report content**

* Pick one or two methods and explain them well
* Portray a deep understanding in at least one of the models
* Justify why we used the model, don’t just work blindly to see what works best
* Can compare multiple methods to see what worked best/worst

1. **Planning information in neural spike train**

* We are asked to predict arm movements only from t=320ms onwards
* BUT there is still information about planning included in the motor cortex neurons
* So when training our model, use all the available data
* The model will take the planning info into account anyway (we don’t have to think about how to leverage it too much)