We used deep learning for two purposes:

1. To learn a sensory-motor mapping
2. To come up with generative model in order to tackle data shortage

Sensory motor mapping:

- We first tried out a small convolution neural network to train the mapping. After a lot of tweaking with the number of hidden layers, the number of neurons in each layer, and hyperparameters, the network was not able to learn well. The code is in the file: Motor_sensory_map1.ipynb
- Different approaches with several traditional ML methods and a fully-connected NN are shown in motor_displacements.ipynb, motor_positions.ipynb. While none learn well, the mappings between displacements and Cartesian position at least roughly resemble the test data.
- We decided to use an existing wavenet model, which was able to train much better.

Generative modelling:

- We opted for GANs to model the distribution of our motor displacements. After following the online tutorial, the code was modified as per our experiment.
    - Link:https://medium.com/@devnag/generative-adversarial-networks-gans-in-50-lines-of-code-pytorch-e81b79659e3f
    - The name of the code is: GAN2.pynb
    - The result from this model has been shown in the poster as well.
- With the aim to improve the performance, the architecture was changed. Batch normalisation was added to make sure that the input to sigmoid function does not enter its saturation region which could have been disastrous for backward gradient flow. However, the network became unstable which we could not resolve in due time.
    - The name of the code is GAN.pynb