ELEC4830/BIEN 4310 Final Project

Experiment paradigm

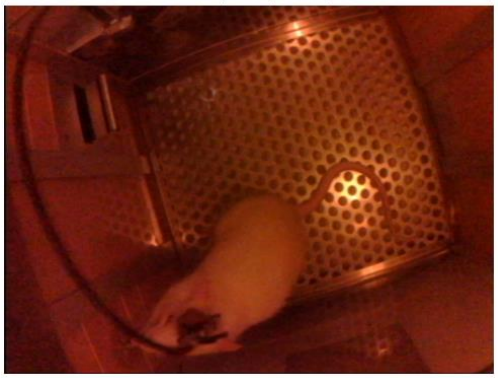
When there is a start cue, the rat is supposed to press the lever. Then a water reward will be given to him. (See the video in the tutorial slides.)

Objective

Classify the rat's lever-press state (press or rest) from his neural firing information (spike).

Press

Rest (not press)



Data description

trainSpike (16x13145)

The row represents different channel.

The column represents the time sequence of the experiment. Each column means 100 ms, so our training experiment lasts for 1314.5 s. The value of the matrix represents the spike count in that time window.

trainState (1x13145)

The column represents the same meaning as the *trainSpike*. The value 0 means, at that time, the rat is in the rest (not press) state. The value 1 means the rat is in the press state. The value *NaN* means the rat's state is not clear.

testSpike (16x3656)

The row represents different channel. The column represents the time sequence of the experiment. Each column means 100 ms. The value of the matrix represents the spike count in that time window. You need to decode the rat's state for all the timestamp in *testSpike* (3656 states in total).

Submission

You need to compress your files into one zip file (name_id.zip). It should contain three files:

1. main.m

   The main part of your code. You should give some comments on the code explaining how to run your code.

2. result.mat

   Your decoding result should be stored in a variable called *decodedState* (row vector, 1x3656).

3. report.pdf

   The report should not be more than 3 pages. There is no need to introduce the detailed algorithm. The focal point should be how you deal with the data. Here is a possible (not necessary) structure for the report:

   a. Preprocessing

      Explain how many historical spikes you have included and how you find the best history number, or other preprocess techniques.

   b. Training data checking

      Explain the expectation of the decoding performance after you see what the training data look like.

   c. Parameter exploration

      Focus on how you improve the performance of your algorithm. You could plot the performance in terms of different parameters.

   d. Performance on the training data

      Confusion matrix of the training data. Validation of the training data.