STA 4103/5107: Homework Assignment #10

(Wednesday, April 4)
Due: Wednesday, April 11

1. (Dynamic Programming in a Hidden Markov Model) we use a Dynamic Programming to estimate the hand kinematics from the firing rate in a Hidden Markov Model.
  (a) Fit all the parameters in the HMM model using both x-position and firing rates in train data "hw10_1_train.mat". You should i) only use x-position; ii) discretize x-position to 20 discrete values; iii) assume the conditional independence of neural firing rates. Plot $\{\pi_n\}$ and $\{\alpha_{nm}\}$. Plot $\{\eta_{nk}\}$ for 2 representative neurons.

  (b) Based on the fitted model in (a), use the Dynamic Programming to reconstruct the x-position in the test data "hw10_1_test.mat". Calculate the decoding accuracy (R^2-Error) to the true x-position. Plot the estimated x-position and true x-position.

  (c) Repeat (a) and (b) for the estimation of y-position.