Wksht 4: Networks

Suppose we have 5 recorded spike trains from 5 different neurons (or we can think about this as 5 trials of the same neuron).

The data is given as 5 different csv files, named as follows:

spikeTime_sim1.csv
spikeTime_sim2.csv
spikeTime_sim3.csv
spikeTime_sim4.csv
spikeTime_sim5.csv

Together in class we will import the data and create a data frame. Then, create a ***raster plot*** of the spike times. You can do this however you like. Use geom_tile() to create lines like we've done previously, use geom_point() to make filled dots, or even play around with changing the shape.

Once you feel happy with your raster plot, ***write a couple of sentences explaining your process.*** Why did you choose the one you did? What other plots did you try? Why didn't you like them?

Homework: Create two more plots (firing rate histogram and ISI) to analyze the network spike trains. Calculate the Fano factor and CV. What do these plots and measures tell us about the firing of the network? Create a slide that contains these figures and your interpretation.

****(for Wed) Adding in synchrony:** Now that we've talked a little about synchrony, let's try to visualize it in your network of neurons. Take your firing rate distribution to be small enough that only one spike per neuron appears in each bin (how can you figure out the largest possible bin you can take so that this is the case?). Then, create a probability of firing distribution and draw a histogram where the y-axis is "probability of firing" Interpret this figure. What does it say about your network of neurons?

Now, you might also want to make the firing-rate curve we saw in class. To do this, you'll want to convert that probability to a firing rate by dividing by the bin width (in seconds) and then use geom_line to plot firing rate against time.