Wksht 2: computing the Fano Factor (FF)

1. Import the spike train data frame using the code:
    spike.df <- read_csv("spikeTime_simX.csv")
replacing X with your group number.

2. Plot the spike times like we did in Worksheet 1. What do you notice about the spike train?

3. Compute the average firing rate, r.

4. Bin the spikes to create a firing rate distribution using the cut() function. You'll want to create a data frame using data.frame() that contains the spike counts per bin.

5. Add a column to your data frame that contains the firing rate in Hz.

6. Use geom_col to create a histogram of firing rates like the one below:
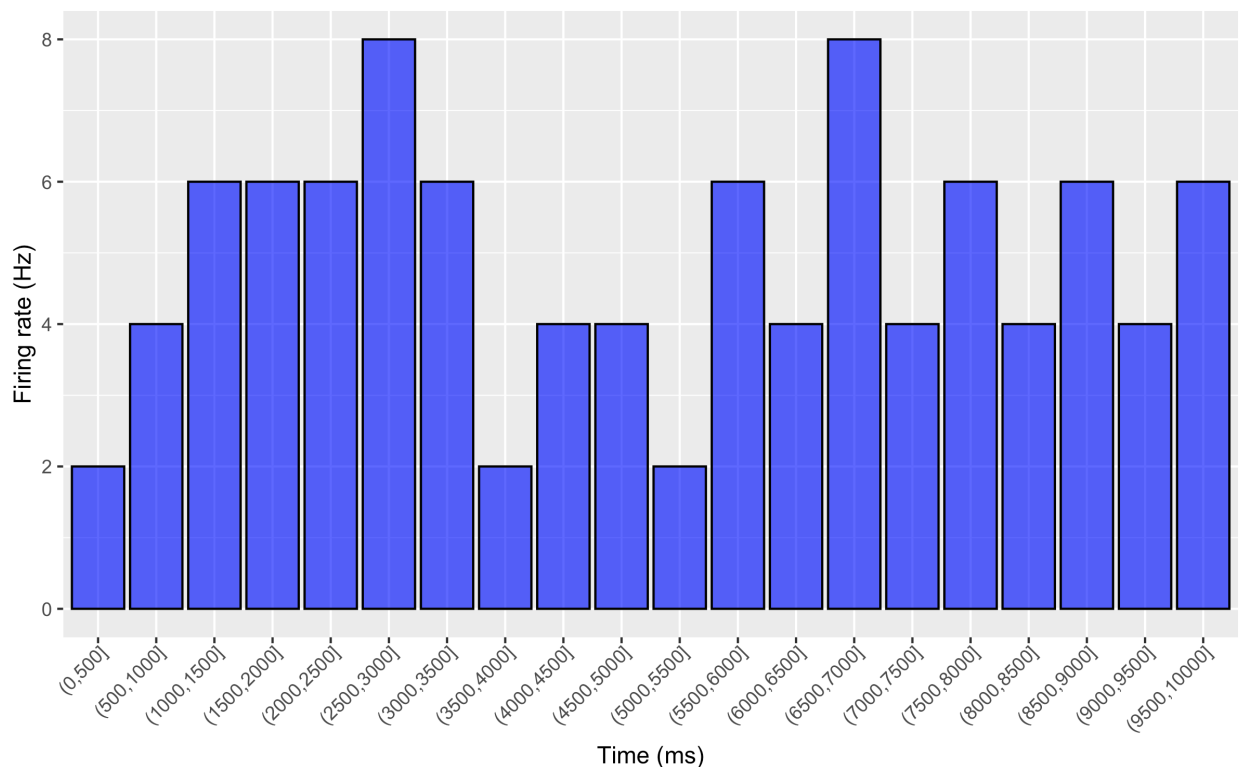
*Note that by using cut() and then geom_col() instead of geom_hist(), we have the spike **counts** accessible and can compute the mean and variance.*

7. Compute the Fano Factor for this spike train. What does it say about the variability in the spike count?

8. (**Homework**) Repeat steps 1-7 for the data "spikeTimes_exampleX_FR.csv" and compare the two results. Explain the similarities/differences between these two spike trains as illustrated by the Fano Factor. You might want to create a slide that puts the figures side-by-side for a better comparison.

Wksht 3: Create the interspike interval (ISI) and compute the coefficient of variation (CV).

1. Import the spike train data frame using the code:
   spike.df <- read_csv("spikeTimes_example1_FR.csv")

2. Create a new data frame that holds the successive spike time differences for the spike train. You will want to use the function diff().

3. Create the following ISI plot (yours may look different)

Interspike interval
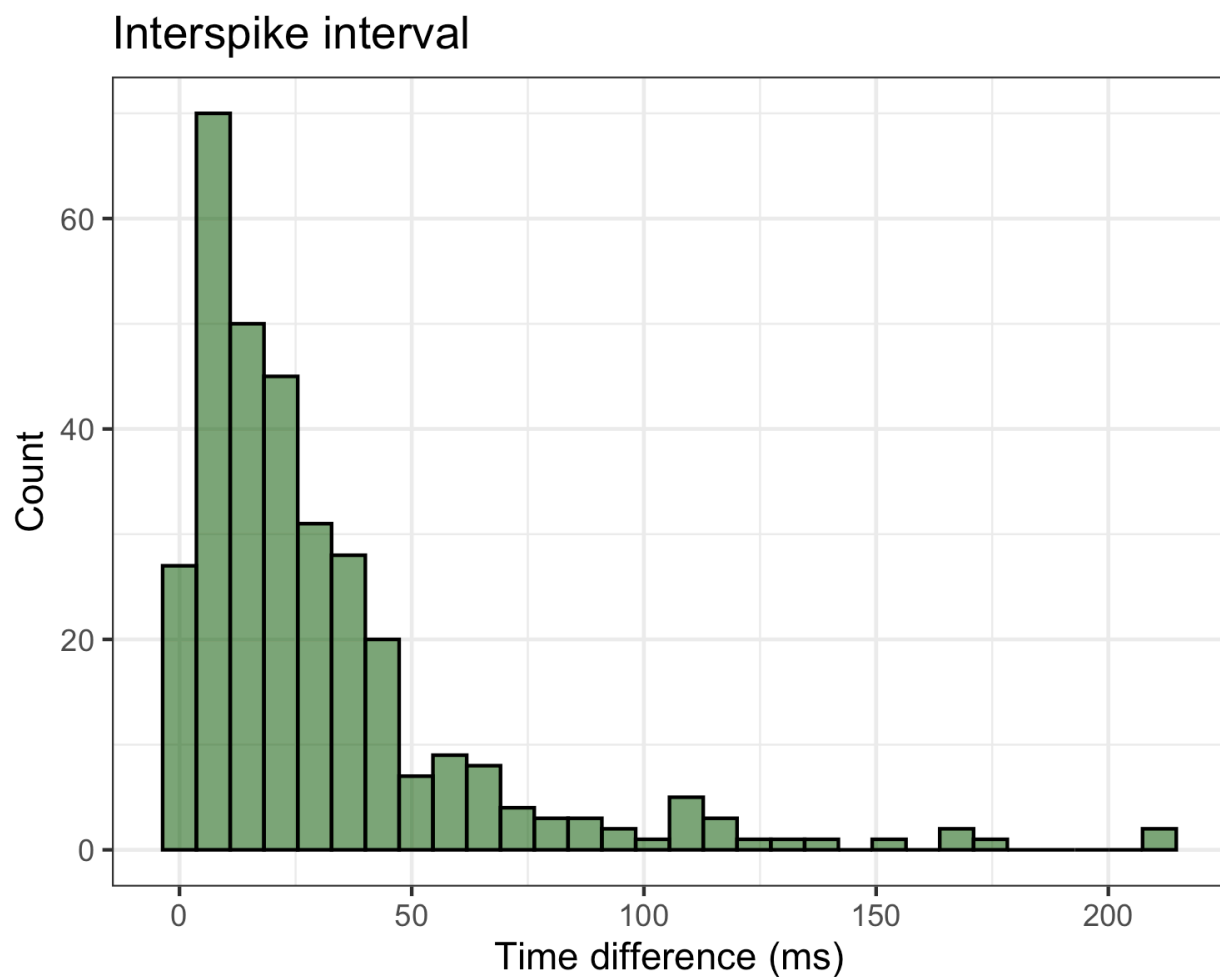
What does this plot tell us about the spike train? What kinds of conclusions can we draw?

4. Compute the coefficient of variation (CV) and discuss what this means about your spike train.

5. (**Homework**) Repeat steps 1-4 for the data "spikeTime_simX_FR.csv" and compare the two results. Explain the similarities/differences between these two spike trains as illustrated by the ISI and CV.
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