# V1 data

Neuron = 13

Exploratory analysis: lines = linspace(0,2\*pi,nplot); smoothing = 10



Model fit:

1. 7 basis for both lambda & gamma.
2. Turn on the Q-tune: first tune Q with , and then optimize the window size based on filtering likelihood.
3. No tune of Q: all Q are setas 1e-3. Just optimize the window size.

For subsampling, I just randomly select n (n < 100) points within each trial. This leads to the “speckled” observations.

The optimized parameters:

|  |  |  |
| --- | --- | --- |
|  | Q-tune | No Q-tune |
| N = 100 | Q = 1e-4\*(0.5181, 0.2526, 0.1653, 0.2009)  windSize = 30 | Q = 1e-3\*(1, 1, 1, 1)  windSize = 10 |
| N = 50 | Q = 1e-4\*(0.3851, 0.1348, 0.1310, 0.1617)  windSize = 30 | Q = 1e-3\*(1, 1, 1, 1)  windSize = 10 |
| N = 20 | Q = 1e-4\*(0.4568, 0.5899, 0.0001, 0.7037)  windSize = 30 | Q = 1e-3\*(1, 1, 1, 1)  windSize = 10 |

Fitting plot:

1. Fol N = 100 (full sample), there’s one more heatmap for comparison. No heatmap for subsamples, since there will be holes in the heatmap and this needs more coding…
2. Line plot
   1. Upper panel = fit; lower panel = observation smoothing (window size = 10)
   2. Since the parameters change point by point (even within trials), the parameters are from averages of the 3 closest angles. Pseudocode:

x0 = linspace(0,2\*pi,10);

for j = 1:length(x0)

[~, sortIdx] = sort(abs(x0(j) – subsampled\_theta));

id = sortIdx(1:3);

end

|  |  |  |
| --- | --- | --- |
|  | Q-tune | No Q-tune |
| N = 100 |  |  |
| N = 50 |  |  |
| N = 20 |  |  |

It seems when sample size is small, no tuning of Q with window is better. Personally:

1. When Q-tuning results are similar to no Q-tuning results, use Q-tuning results: as shown in the N = 100 & 50 case, Q-tuning results seems can capture pattern more significantly.
2. When these 2 are differs a lot, maybe we should believe no Q-tuning results.
3. No matter what, no Q-tuning is always a good start point to see patterns quickly.

# Hippocampus Data

Neuron = 27; 4 basis for both lambda & gamma.

Turn off the Q-tuning off, and only with window size selection. windSize = 10. Just do some basic checks as follows. If we need to add this into the application examples, I will try to plot window smoothing observation with model fit as previous. But there’s a problem: the observation is pretty sparse for hippocampus data, and this may make window smoothing (for obs.) very hard for some positions. **Basically, how to plot? That’s a question.**

 

