The Q are still the same, since (1) Q is the prior process noise & (2) in real fitting, we always use no window smoother to select Q (so the Q is always the same for different methods).

See the code for grid calculation in <https://github.com/weigcdsb/COM_POISSON/blob/main/demo/smoother_fail/testLlhdGrid.m>.

The code for special cases (examples): <https://github.com/weigcdsb/COM_POISSON/blob/main/demo/smoother_fail/special_Cases.m>

The window size is selected by **forward chaining**.

Chart

Description automatically generated

# Constant

200 recording steps

Beta: range from 0.5 to 2.5

Gamma: range from -0.5 to 2.5

For example beta = 2, gamma = 1

|  |  |  |
| --- | --- | --- |
|  |  |  |

The selected window size for different ranges



All of them are 1, i.e. no window. (Occasionally, window size will be selected as 3 or 5)

Calculate the (mean of 10) test llhd & use Fisher smoother as the baseline, i.e. show (1) exact smoother – fisher smoother, (2) window smoother – fisher smoother and (3) NR – smoother.



Use private colorbar range to show tiny negative values



It seems no window (window now is equivalent to no window smoother, because the size is 1) is good enough. But the differences are really small.

Window/ Fisher-smoother vs. NR (NR - window)



Nearly no differences.

Maybe the values of lambda/ nu won’t influence the performance a lot.

# Linear

200 recording steps

Beta: start from 0, the range of beta after 200 steps = [0, 3]

Gamma: start from -1, the range of gamma after 200 steps = [1, 3]

For example, beta\_range = 2, gamma\_range = 2

|  |  |  |
| --- | --- | --- |
|  |  |  |

The selected window size for different ranges



1 1 1 1 1 1 1 3 3 3

3 3 1 1 3 1 3 3 3 1

3 1 1 3 5 3 3 3 3 5

3 3 1 3 3 3 5 3 5 5

1 3 3 5 5 3 5 3 7 5

1 3 9 5 5 3 3 5 3 133

9 5 7 3 3 5 5 5 5 5

5 7 7 5 9 7 7 5 5 35

9 5 9 11 9 7 7 7 7 9

13 11 19 7 7 9 7 5 7 9

Generally, larger range needs larger window size. It seems the window size selection is more sensitive to the range in nu.

Calculate the (mean of 10) test llhd & use Fisher smoother as the baseline, i.e. show (1) exact smoother – fisher smoother, (2) window smoother – fisher smoother and (3) NR – smoother.



Use private colorbar range to show tiny negative values



NR is consistently better than Fisher smoother, but window smoother can be a bit worse sometimes.

Window vs. NR (NR - window)



NR and window have their own strength: no one beats the other always. Generally, for the larger jump in nu (or gamma), the window is usually better.