CNS2025: Homework 11

Due: 2025-11-19 23:59

Consider the same 11-cell system of Gaussian tuning curves with preferred stimulus values from -5 to 5 and standard deviation 1. Following are the results of three measurements:

Neuron ID		A	B	C	D	E	F	G	H	I	J	K
Preferred stimulus		-5	-4	-3	-2	-1	0	1	2	3	4	5
Spike count	Recording 1	0	0	0	0	0	1	2	1	3	1	0
	Recording 2	0	0	1	2	0	0	2	2	1	0	0
	Recording 3	0	0	0	0	0	1	2	4	1	0	0

Exercise 1

Calculate the maximum-likelihood (ML) estimates of the stimulus from the three measurements separately. Calculate the overall ML estimate of the stimulus.

Exercise 2

Assuming a Gaussian prior of the stimulus with $s_{\text{prior}} = 0$ and $\sigma_{\text{prior}} = 4$. Calculate and plot the posteriori $p[s|\mathbf{r}]$ **(1)** after considering Recording 1 **(2)** after considering Recordings 1 & 2 **(3)** after considering all three Recordings.

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