Coursework 2 – Computational Neuroscience

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Q1

Mean and Standard deviation taken from 100 samples to perform calculations.

Fano Factor

	Refractory Period 5 ms	No Refractory Period
Window Interval 10 ms	0.7483 ± 0.00216	0.9995 ± 0.00414
Window Interval 50 ms	0.6934 ± 0.00714	0.9995 ± 0.00958
Window Interval 100 ms	0.6873 ± 0.00979	1.0015 ± 0.01474

Coefficient of Variance

Refractory Period 5 ms	No Refractory Period
0.826 ± 0.0045	0.999 ± 0.0048

Solution in *poisson.py*

Q2

Fano Factor

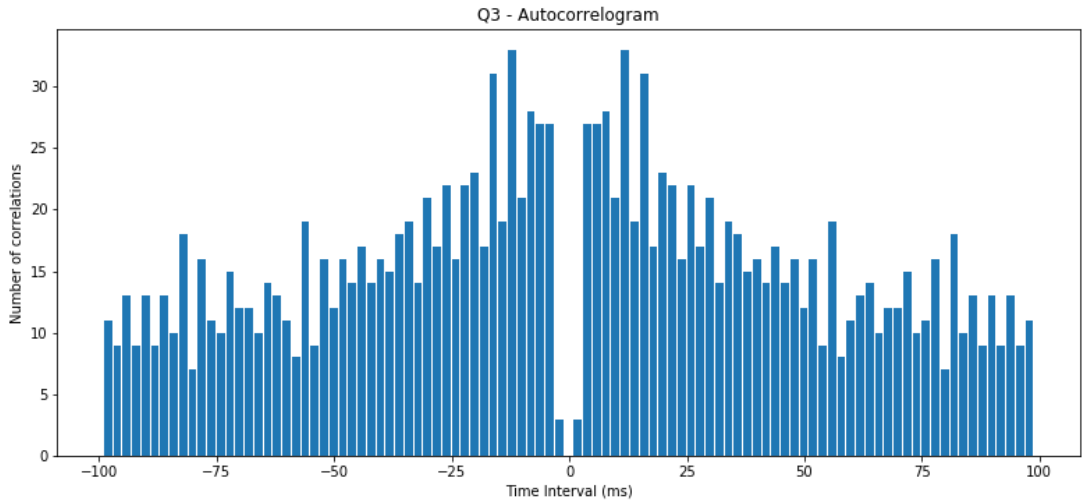
Window Interval 10 ms	1.1159
Window Interval 50 ms	2.93091
Window Interval 100 ms	4.1031

Coefficient of Variance

2.008

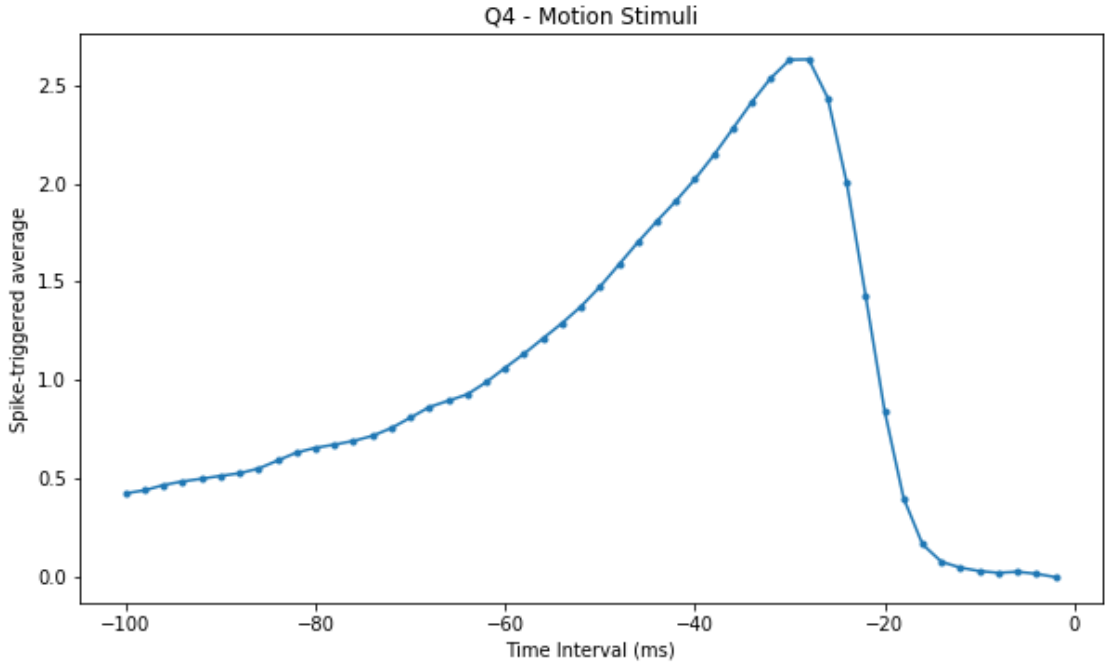
Solution in *load.py*
To make this script work locally, store this environment variable first:
export ABS_PATH=/path/to/folder/where/data/file/is

Q3



Solution in "*Q3 – Autocorrelogram.ipynb"* notebook and exported as Python file in *autocorrelogram.py*

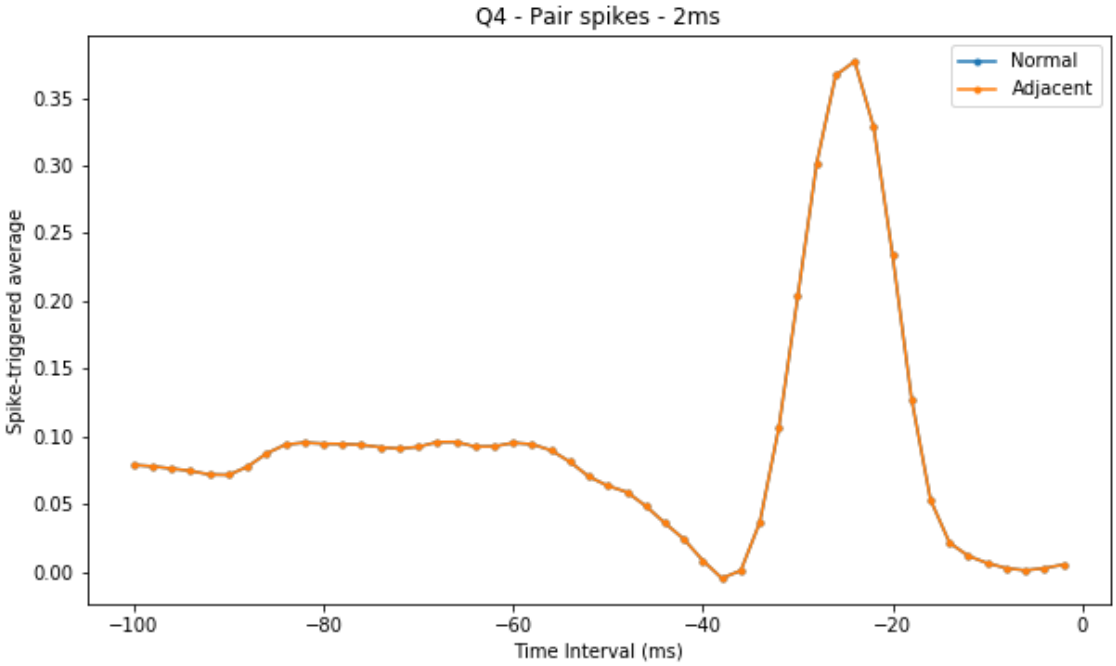
Q4 – Spike-Triggered Average



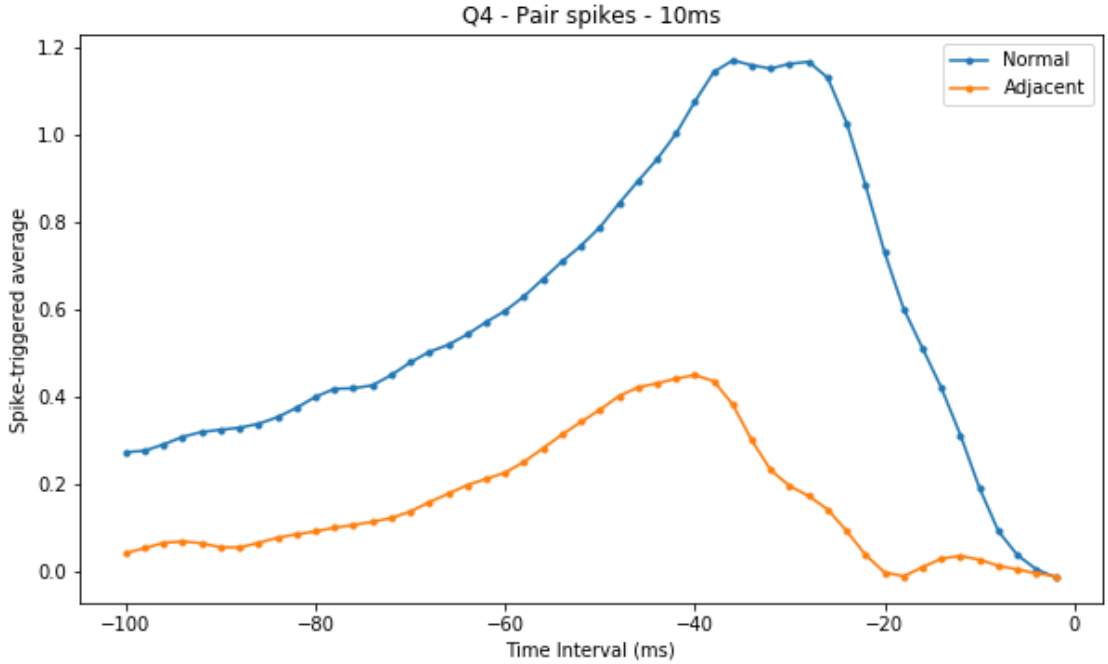
Q4 - Extra - Pair Spike-Triggered Average

2 ms window

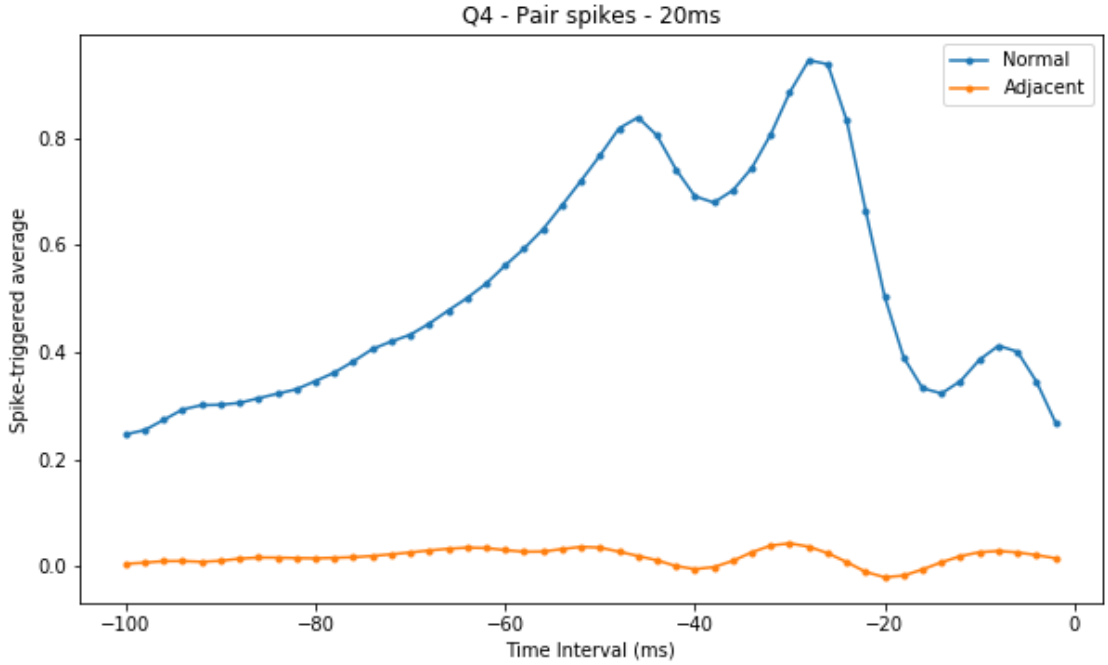
The blue curve is overlapped by the orange one.


Q4 - Pair spikes - 2ms
Normal
Adjacent
Spike-triggered average
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
−100
−80
−60
−40
−20
0
Time Interval (ms)

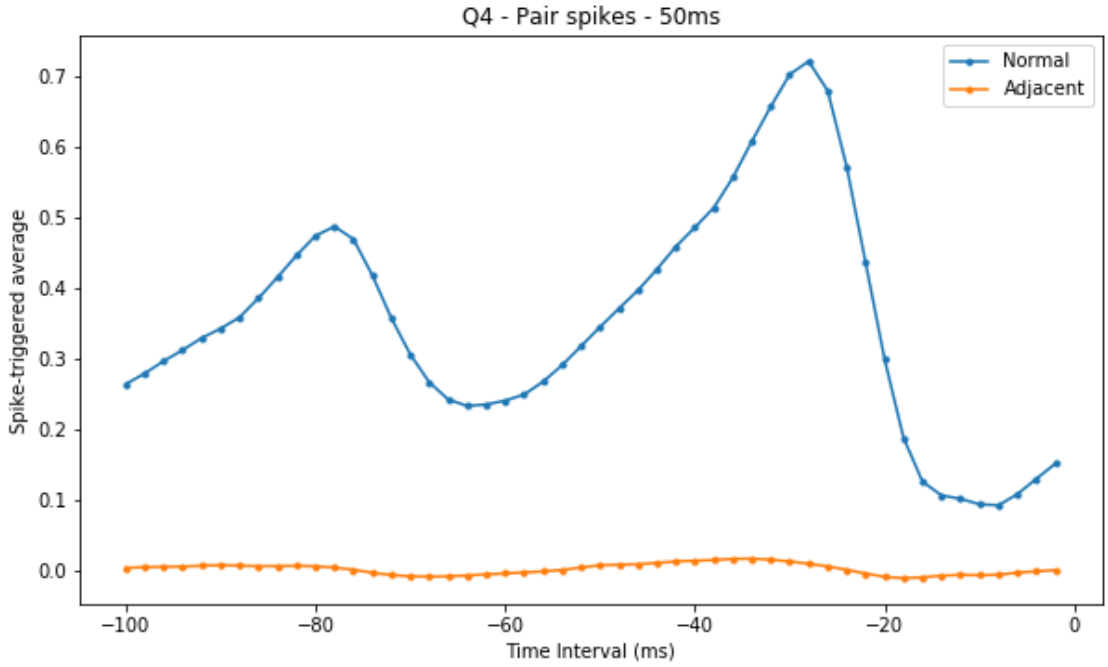
10 ms window


Q4 - Pair spikes - 10ms
Normal
Adjacent
Spike-triggered average
1.2
1.0
0.8
0.6
0.4
0.2
0.0
−100
−80
−60
−40
−20
0
Time Interval (ms)

20 ms window



50 ms window



Solution in "*Q4 – Spike_triggered_average.ipynb"* notebook and exported as Python file in *spike_triffered_average.py*