

7/5/20

Yuvraj S. Katz

Assignment 4

1) see file ^{ex1.py} for section a. (ass04 ~~ex1.py~~ ~~ex2.py~~).

neuron has 1453 spike in 200 sec, continuous trigger.

<C17

b) The optimal frequency to change neural activity should be

around the Δt of 12 msec. ($Hz = \frac{1000}{83.3}$) $\frac{1000}{12} = \text{freq}(Hz)$

$$D_{17} = \frac{CE^2}{V(s)}$$

2) see file ex2.py + ass04ex2.py.

We use the kernel to evaluate estimator.
↓
Proportion to original rate

(b) kernel optimized by ^{variance} ~~rate~~ division

Norm by rate (c) Based on kernel result, the neuron reacts 2 msec before stim. ⁺ could be visual ganglion neurons....

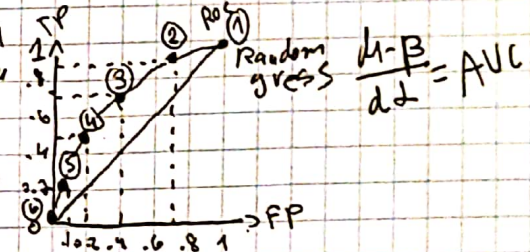
3) H_0 : control

H_1 : disorder

$$AUC = \int ROC = p(\text{success})$$

a)

	0	1	2	3	4	
TP	0.3	0.3	0.2	0.3	0.2	Control
FP	0.1	0.2	0.2	0.3	0.2	disorder



TP	1	0.9	0.7	0.5	0.2	0
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FP	1	0.7	0.4	0.2	0.1	0
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①	②	③	④	⑤	⑥
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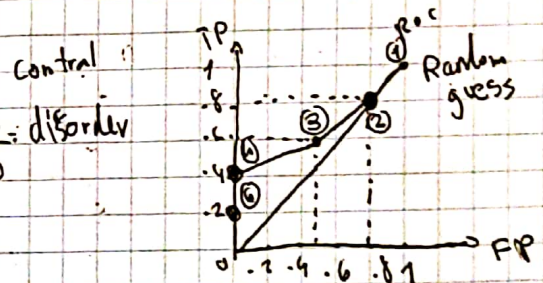
0.2	0.3	0.5	0	0	
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0.2	0.2	0.2	0.2	0.2	0.2
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①	②	③	④	⑤	⑥
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1	0.8	0.5	0	0	0
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1	0.8	0.6	0.4	0.2	0
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identify the disorder

b) AUC_{P314} will be much better since $AUC_{P314} > AUC_{N231}$

$$c) AUC_{P314} = \int_0^1 TP dFP = \frac{(0.7+0.2) \times 0.1}{2} + \frac{(0.2+0.5) \times 0.1}{2} + \frac{(0.4+0.7) \times 0.2}{2} + \frac{(0.9+0.7) \times 0.03}{2} + \frac{(1+0.9) \times 0.3}{2} = 0.005 + 0.035 + 0.11 + 0.24 + 0.285 = 0.681$$

$$AUC_{N231} = \frac{(0.4+0.6) \times 0.5}{2} + \frac{(0.6+0.8) \times 0.3}{2} = 0.25 + 0.21 = 0.46$$

$$1 - 0.46 = 0.54$$