

Quiz 8

November 14, 2023

Problem 1

- 1) Let there are one possible rate and $P[r_1] = 1$, Calculate its entropy
- 2) Let there are two possible rate and $P[r_1] = 1/2, P[r_2] = 1/2$. Calculate its entropy
- 3) Which has a larger entropy, the concentrated probability distribution or the uniform probability distribution?

Problem 2

Let $P[+] = P[-] = 1/2$ $P[r_+|+] = P[r_-|-] = 1 - P_X$, $P[r_+|-] = P[r_-|+] = P_X$ Calculate its mutual information

Problem 3

- 1) spike train is
- 2) $FR = \underline{\hspace{2cm}}$
- 3) Why does the indepent neurons have larger entropy?

Problem 4

- 1) We want to maximize
$$H = - \int_0^\infty dr p[r] \log_2 p[r]$$
subject to $\int_0^\infty dr p[r] = 1$
show that if the average firing rate is constrained to a fixed value r_{avg} , the maximizing p is exponential.
- 2) Show that if the variance is also fixed to r_{var} , the maximizing probabillity density function becomes a Gaussian. Find the proba-bility density function p[r]

Problem 5

Read the summary slide and express it in your own language.