

Homework 2 Part 1 (10 points)

Maximum Likelihood Estimation and NLL loss

(This is a general method to estimate parameters of a PDF using data samples)

Suppose we have N i.i.d. (independently and identically distributed) data samples $\{x_1, x_2, x_3, \dots, x_N\}$ generated from a PDF which is assumed to be an exponential distribution. $x_n \in \mathcal{R}^+$ for $n = 1$ to N , which means they are positive scalars. This is the PDF:

$$f(x) = \begin{cases} \lambda e^{-\lambda x} & \text{for } x \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Your task is to build an NLL (negative log likelihood) loss function to estimate the parameter, λ , of the PDF from the data samples.

(1) write the loss function: it is a function of the parameter λ

(2) take the derivative of the loss with respect to λ , and set the result to 0.

After some calculations, you will obtain an equation about λ =*****

Hint: read NLL in Lecture5_GMM.pdf

Homework 2 Part 2 (25 points)

Complete the task in H2P2T1.ipynb