Bayesian Inference: Ytube: “Frequentism and Bayesianism: What’s the Big Deal?

* Uncertainties:

The voltage is 100 +/- 4 V. What does that plus and minus mean?

1. Frequentist: If this experiment is repeated many times, **in 95% of these cases** the computed confidence interval will contain **the true voltage**.
2. Bayesian: Given our observed data, there is a 95% probability that **the values of voltage** lies within **the credible region.**

Conditional Probability

* Maximum likelihood
* the estimate value is fixed!!
* Bayesian approach :

If we guess , then we may calculate

So that the probability distribution is obtained. 🡪

* is a random not fixed.

What is a Big Deal?

1. The number of measured data is finite, it may not represent the whole probabilistic feature

(Of course it is increased, it may be approached)

1. Bayesian case: how to guess

* Regarding Control problem

Bayesian inference gives use the . However for state feedback we the specific value of it.

Then

is one of the optimal estimator under some constraint

* For the state feedback, !!
* Textbook: “Bayesian Filtering and Smoothing”. Simo Sakka, 2013
* Textbook:

1. “Bayesian Filtering and Smoothing”. Simo Sakka, 2013
2. “Kalman and Baysian Filters in Python”, Roger, 2020

* Requirements

1. In theory, the base of Kalman…
2. Python will be used to simulate. 🡪 Jupiter Notebook !!

* Almost all materials are in github.com/snkim0701/2024\_estimation(PhD)