

Assignment 0: PyTorch and Probability Basics

CS 4756, Spring 2023

Due on: 1/31/2023

Overview

In this assignment, you will be able to check your familiarity with Pytorch and Probability. Through this brief, introductory journey, you will:

- Code up a basic linear regression model using Pytorch
- Tackle a problem dealing with bayes rule and robots!

Q1: Pytorch/Numpy/Python

This question is located on a google collab, linked [here](#).

Q2: Bayes Rule

Your lab has just bought a robot from a local startup. The robot has a range sensor that measures ranges from 0 to 5 meters. However, the robot is just a prototype, and the company tells you that a sensor fault could leave the robot constantly outputting a range below 3 meters, regardless of the actual range. The company says that the prior probability of a sensor fault is $p=0.05$

During a trial run, you receive a series of N readings from the range sensor, Each time, the measurement falls below 1 meter. Assuming that actual ranges are distributed uniformly, what is the posterior probability of a sensor fault? Formulate your answer as a probabilistic model.

Extra Credit (Note, all extra credit problems are optional for students taking the 4xxx version of this course, but compulsory for students taking the 5xxx version):

Let's say the robot got stuck at $0.5m$ from a wall. What would the posterior probability be as time goes on? What assumption did we make earlier that is now not true? How would you relax it?