PHYS 243

Homework 3

Deadline: May 2, 2021, at 23:59

Additional notebook from the course textbook which you might find useful:
Link to notebooks

Problem 1: Linear Regression

First take a look at the dataset and it's description at the following link related to the relationship between birth rate in a country and its economical development:

Link to data
Link to description

Assume you can predict the birth rate from Per Capita Income, Proportion of population on farms, and Infant Mortality Rate, using a linear model.

1. Find the best model parameters using gradient descent and assuming least square loss function.
2. Plot the loss function versus steps of the gradient descent.
3. Predict the birth in Canada using the following values:

   Per Capita Income: 993
   Proportion of population on farms: 0.19
   Infant Mortality Rate: 33.7

Problem 2: Logistic Regression

Download the dataset from the following link: Link to data

The following figure shows the dataset with two features and a binary classification (color).

1. Divide the data into 70/30 percent for training/testing.
2. Find the best parameter of the logistic function assuming a cross-entropy loss and using one of the optimization techniques.
3. Find the performance of your trained model on the testing dataset.

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