Carnegie Mellon University

17-644: Applied Deep Learning
Assignment #1

Assigned: Tuesday, March 18th
Due: Tuesday, March 25th

Assignment Description

Generate a synthetic dataset containing:

- 1,000 observations of one feature (x), randomly generated between 0 and 1

- 1,000 corresponding observations of a target (y), which you define as some linear function of x plus a small amount of random noise

First, use `sklearn` to perform linear regression, plot the observed vs. predicted values, and annotate the R^2 value on the plot.

Next, use `TensorFlow` to instantiate a neural "network" containing a single neuron, and use it to perform linear regression on your synthetic data. Plot the observed vs. predicted values, and annotate the R^2 value on the plot.

Finally, compare the coefficient values generated by the single neuron model with the traditional linear regression model.

Hint 1: The `TensorFlow` model should have one weight and one bias term, and they should correspond to the linear coefficient value and bias term generated by `sklearn`.

Hint 2: The lecture slides, as well as Chapter 2 of Michelucci's 2nd edition contain code that you can use if you'd like:

- Michelucci, U. (2022). *Applied deep learning with TensorFlow 2* (p. 99). 2nd Edition. Springer, Berlin, Germany.
- https://adl.toelt.ai/single_neuron/Linear_regression_with_one_neuron.html

Deliverable

Turn in a clean, well-formatted short report describing your process and results, along with code snippets for important steps, and your own interpretations of the modeling exercise.