Aerospace Computing

Assignment 4

Due: 2/9/24

In doing this assignment, remember to visualize your results with a line for the curve fit and symbols for your data points.

1. Write Python functions for the following text algorithms and add them to your personal numerical analysis module.
    a. newtonPoly,
    b. rational,
    c. cubicSpline,
    d. polyFit
    e. plotPoly.
2. Use two of the above algorithms to solve text Problem Set 3.1 numbers:
    a. 15 (rational and another)
    b. 17 (any two)
3. Use the appropriate algorithms to solve text Problem Set 3.2 numbers:
    a. 2
    b. 16
4. Use the "Assignment" dataset provided in **assignment.py** to do a regression fit using Deep Neural Networks (DNNs). Set parameters and get the Validation error to be around 0.925 and report the following in a Jupyter Notebook file.
    a. Epochs, Learning Rate, Layers, momentum, percentage of train-test split
    b. Plot the dataset, DNN model on the train dataset, loss and prediction, validation plot, and validation against real data set plot
5. Explain the following parameters effect on the regression fit. Tabulate results in columns; Parameter, Total Loss, Validation Error, and Comment
    a. Decrease number of layers
    b. Decrease number of neurons in a layer
    c. Increase train data percentage
    d. Decrease and Increase epochs
    e. Decrease the learning rate
    Tip: Change the parameter specified and compare train loss and validation error to your solution from question 1. Concerning issues include overfit, underfit, time taken for convergence