

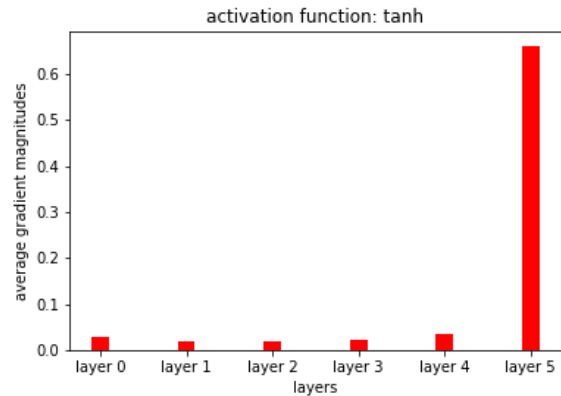
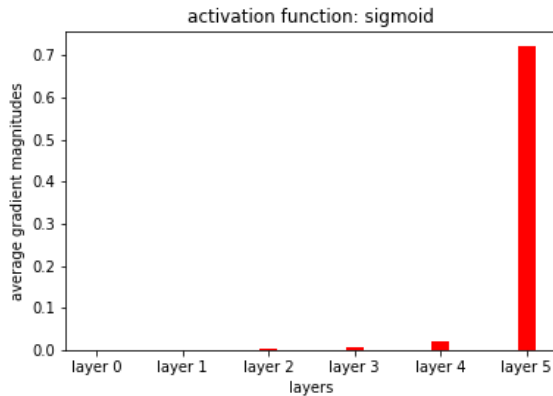
# CS-568 Deep Learning - Assignment 1

## Backpropagation for MLPs

Fall 2020

Assigned	Thursday, February 11, 2021
Due	Thursday, February 18, 2021 before 11:00 pm

- In this assignment, we will implement the backpropagation algorithm for training an MLPs.
- The main python scripts in this assignment are
  1. **driver\_nn.py** creates the object of neural network class that can be further used to call train and test functions.
  2. **neural\_network.py** contains train and test functions.
  3. **f\_load\_dataset.py** generates data from three different functions ( $\sin(x) \sin(2x)$ ,  $\sin(x)/x$ ,  $\sin(2\pi x) \sin(x)$ ).
  4. **f\_check\_gradient.py** confirms the correctness of the analytical derivatives.
  5. **f\_utils.py** consists of activation function and their derivatives.
- **neural\_network.py** also contains code to plot average gradient magnitudes that show vanishing gradients problem. We can see the two different plots of gradient magnitudes here.



- You have to add the missing code in these scripts
  - **neural\_network.py**
  - **f\_check\_gradient.py**
  - **f\_utils.py**
- The submission **.zip** file should only contain
  - **neural\_network.py** (20 marks)
  - **f\_check\_gradient.py** (10 marks)
  - **f\_utils.py** (10 marks)
  - Figures 2 to 6 (60 marks)
- Plot the output function in Figure 2, 3 and 4 using your code as illustrated in Figure 1.
- Reproduce Figure 5 and 6 using **generate\_results.py** script.

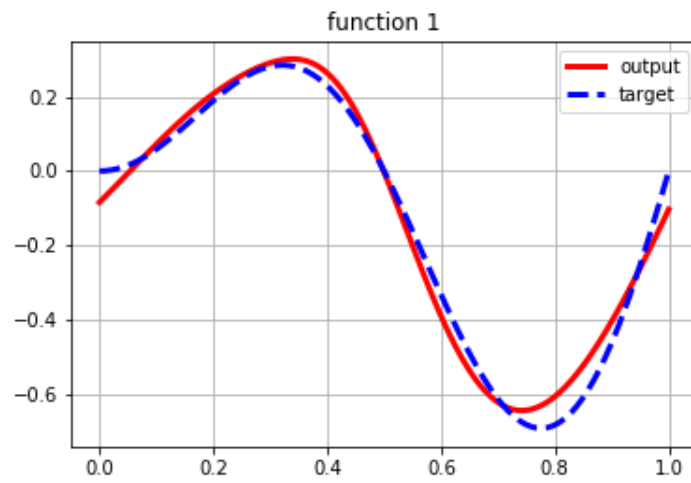


Figure 1: Sinusoidal function output and target plots.



Figure 2: Plot output of this function. (10 marks)

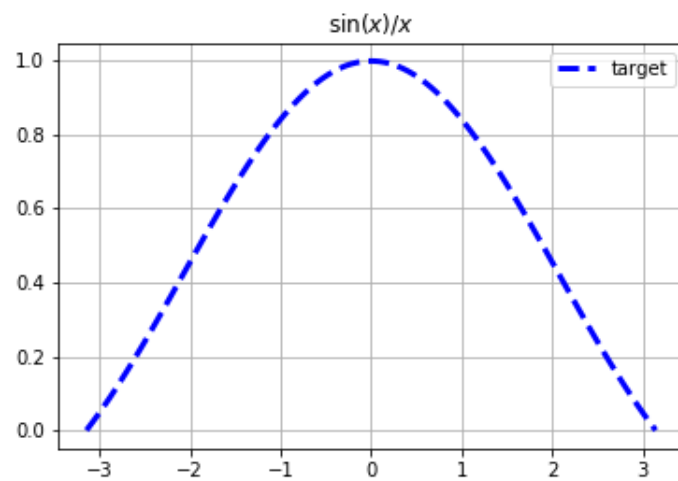


Figure 3: Plot output of this function. (10 marks)

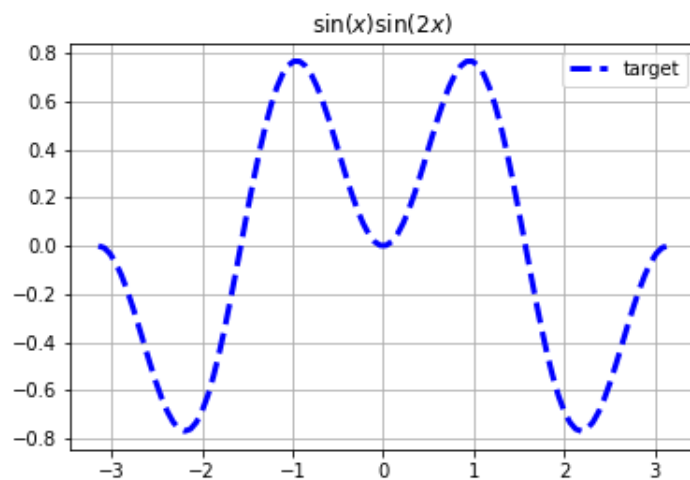


Figure 4: Plot the output of this function. (10 marks)

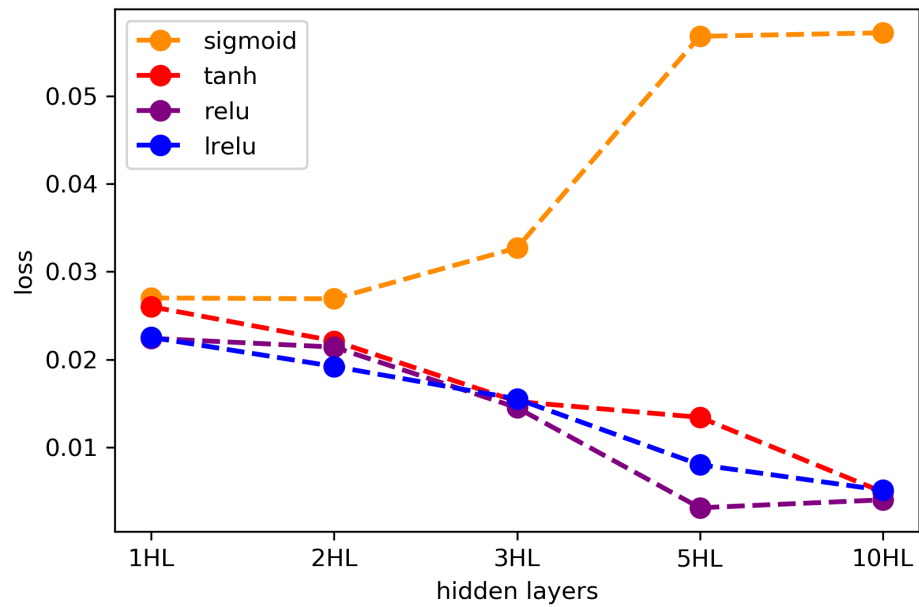


Figure 5: Official image. (20 marks)

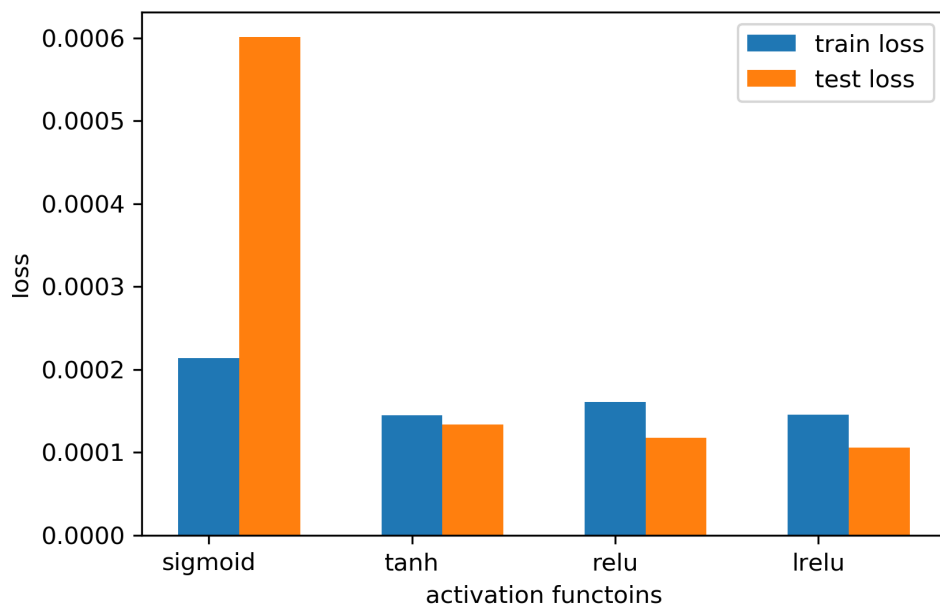


Figure 6: Official image. (10 marks)