Python Homework for Deep learning summer school 2020

Requirements:

1. Write your code yourself.
2. It is not recommended that you go online to find the answer.
3. Please get your codes and results screenshot in a pdf file named "python_hw.pdf". If you write your code with jupyter notebook, you can submit your jupyter .ipynb file and name it "python_hw.ipynb". Remember to add your name and ID in the file.

Problem 1

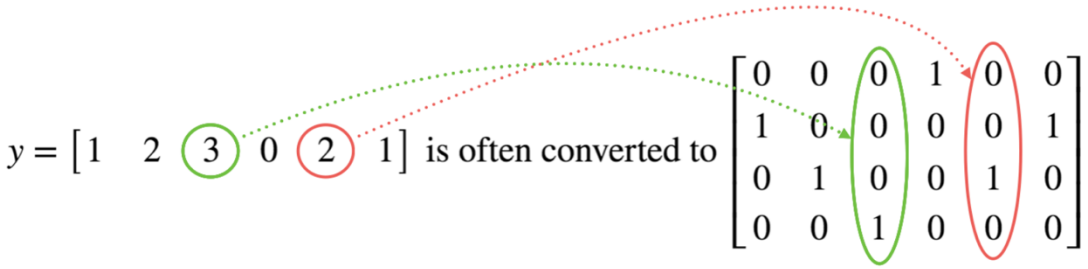
Create a one-dimensional array containing the numbers 0-19 using numpy. (1) Extract all odd numbers and print them. (2) Modify the odd number to -1 in place. (3) Returns a copy of the array with the even number modified to -1 without changing the original array.

Problem 2

Create a matrix of size 4×4 using numpy. (1) Take out the middle 2×2 matrix. (2) Switch the first and second columns of the matrix. (3) Reverse each row in the matrix.

Problem 3

Convert the below array y to a one-hot matrix using numpy:



$$\begin{bmatrix} 0 & 0 & 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \end{bmatrix}$$

Problem 4

Create two matrices of size 5000×5000 with random numbers. Calculate matrix multiplication using numpy with CPU and using pytorch with GPU. Record calculation time and compare. (You may need time package in Python.)

Problem 5

Select one image yourself with any size. Change the length and width of the image to half of the original using scipy. Show two images.

Problem 6

Show two functions for x in [-5,5] together in one figure using matplotlib:

$$(1)\ f_1(x) = \frac{1}{1 + e^{-x}}$$

$$(2)\ f_2(x) = \max(0, x)$$