

## Deep Learning Workshop With Python (CSE 3194)

### ASSIGNMENT-2: INTRODUCTION TO NUMPY ,PANDAS,MATPLOTLIB, LOSS FUNCTIONS

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1. Write a Python code to multiply two 3x3 matrix using Numpy.
2. Write a Python code to convert a 2D array in 1D without using numpy function.
3. Write a Python code to generate an array of 10 numbers between 1 and 100 and find their mean and variance without using numpy function.
4. Write a Python code to find the transpose of a matrix without a numpy function.
5. Write a Python code to generate 12 states of Markov chain for the given weather states as ['Sunny', 'Rainy', 'Cloudy'] and the transition matrix as [[0.6,0.2,0.2],[0.3,0.5,0.2],[0.5,0.4,0.1]] where the row indicate the current state and column indicate the next state.
6. Write a Python code to create a dataframe and perform the following operations:  
data = {"id": [1,2,3,4], "Name": ["Ram", "Bob", "Dave", "Jill"], "Age": [25, 30, 35, 32], "Gender": ["Male", "Male", "Male", "Female"], "City": ["New York", "Los Angeles", "Chicago", "New York"]}  
A) Save the dataframe to data.csv file (Use df.to\_csv(filename, index=False) function).  
B) Select a specific column "Age" from the dataframe.  
C) Find the shape of the dataframe.  
D) Filter rows based on a condition where age > 30.  
E) Sort a DataFrame by an increasing order of age.  
F) Filter the dataframe based on the given condition Age > 30 and Gender == 'Male'  
G) Rename the columns as 'UniqueID', 'Full Name', 'Years' (instead of Age)  
H) Create another dataframe from dict1 = {"UniqueID": [1,2,3,4], "Salary": [50000, 45000, 60000, 70000]} and merge two dataframe based on a column id.
7. Write a Python code to plot a function  $y=x^2$  take 100 values of x in the range of -10 to 10. (Use linspace)
8. Write Python code to plot a bar graph with the given information:  
categories = ["A", "B", "C", "D", "E"]  
values = [10, 25, 35, 40, 55]  
colors = ["red", "green", "blue", "purple", "yellow"]
9. Write a Python code to perform the following operations on the given values:  
y\_true = [0, 1, 1, 0, 1, 0, 1, 1, 0, 0]  
y\_pred = [0, 1, 0, 0, 1, 1, 1, 1, 0, 1]  
A) To generate a classification report on the given values.  
B) To extract the precision, recall and F1-score and visualize using bar chart.  
C) To plot a confusion matrix using matplotlib.  
D) To visualize the precision, recall and F1 score using bar chart.
10. Write a Python code to generate a classification report and extract the precision, recall and F1-score for a multi-class problem and also visualize it as given below:  
y\_true\_multi = [0, 1, 2, 2, 0, 1, 1, 2, 0, 0]  
y\_pred\_multi = [0, 1, 2, 1, 0, 2, 1, 2, 0, 1]

11. Write a Python code to find the mean square error for the given value from scratch:  
`y_true = [4.5,1.5,11.4,13.3,11.0,10.9]`  
`y_pred = [3.4,2.1,12.1,10.2,12.0,14.2]`
12. Write a Python code to find the mean absolute error for the given value from scratch:  
`y_true = [4.5,1.5,11.4,13.3,11.0,10.9]`  
`y_pred = [3.4,2.1,12.1,10.2,12.0,14.2]`
13. Write a Python code to find `binary_cross_entropy_loss` for the given value:  
`y_true = [1, 0, 1, 1]`  
`y_pred = [0.9, 0.2, 0.8, 0.7]`
14. Write a Python code to find multiclass cross-entropy loss for the given data values:  
`y_true = [[1, 0, 0], [0, 1, 0], [0, 0, 1]] # One-hot encoded`  
`y_pred = [[0.7, 0.2, 0.1], [0.1, 0.8, 0.1], [0.2, 0.1, 0.7]]`