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E/16/156

CO542

Neural Networks and Fuzzy Systems

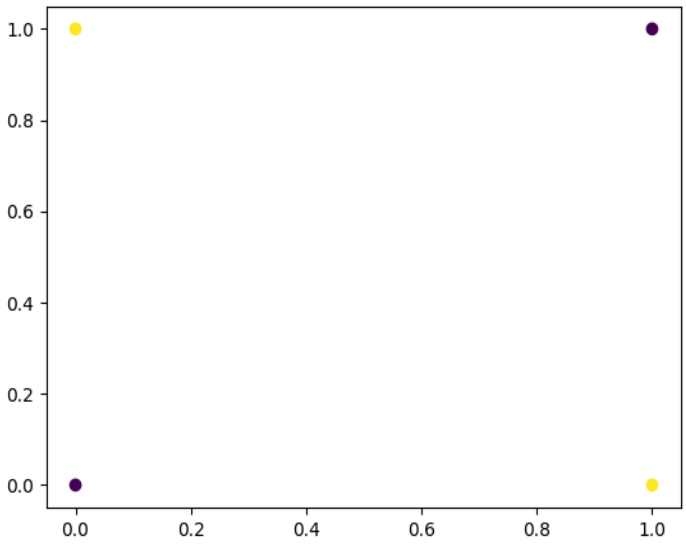
2021

Lab 04 - MLP

Task 1

1. **What is the number of inputs and outputs of the neurons?**
   Input : 2 neurons
   Output : 1 neuron

2. **Why is this problem NOT linearly separable?**
   Let us consider the following figure.



We can't linearly separate yellow points [(0,1) , (1,0)] and purple points [(0,0) , (1,1)] by drawing a straight line. So this is not linearly separable.

3. **What is the input training vector and target vector?**
   Input training vector : [[0,0], [0,1],[1,0],[1,1]]
   Target vector : [0,1,1,0]

4. **Create a network named 'netXOR' with 2 neurons in the input layer, 5 neurons in the hidden layer and 1 output neuron.**

F:\Engineering\Third year\Sixth semester\CO542\Lab\Lab4\Task1\exercise.py - Notepad++

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e15211_lab5.py | exercise2.py | Lab06_E15119.ipynb | lab06_E15119.py | exercise.py

```
1  from sklearn.neural_network import MLPClassifier
2  from sklearn.model_selection import train_test_split
3  import matplotlib.pyplot as plt
4  import numpy as np
5  from itertools import product
6
7  #create a variable named data that is a list that contains thhe four possible inputs to an AND gate
8
9  data = [[0,0], [0,1],[1,0],[1,1]]
10 labels = [0,1,1,0]
11
12 plt.scatter([point[0] for point in data], [point[1] for point in data], c= labels)
13 #the third parameter "c=labels" will make the points with label 1 a dfferent color than points with label 0.
14 plt.show()
15
16 #Creating a network'netXOR' with 2 neurons in the input layer, 5 neurons in the hidden layer and 1 output neuron
17 netXOR = MLPClassifier(hidden_layer_sizes = (5), activation = 'relu', random_state = 1)
18 netXOR.fit(data,labels)
19 print("score of netXOR")
20 print(netXOR.score(data,labels))
```

Output

```
F:\Engineering\Third year\Sixth semester\CO542\Lab\Lab4\Task1>python exercise.py
score of netXOR
0.75
```