Roll No.: 19BCE041

Course : Machine Learning

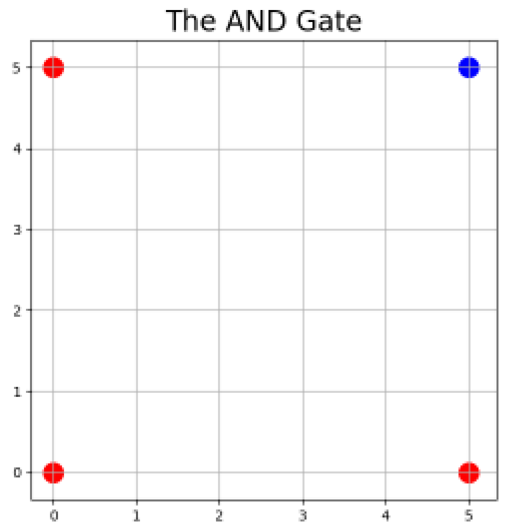
Course Code : 2CS501

Practical : 8

AND gate using Perceptron Learning

In the field of Machine Learning, the Perceptron is a Supervised Learning Algorithm for binary classifiers

A single perceptron can learn any function, as long as the instances in the dataset are linearly separable, like AND, OR, NAND, and NOR!



```
import numpy as np
```

```
Data = [[0,0,0,0],[0,0,1,0],[0,1,0,0],[0,1,1,0],[1,0,0,0],[1,0,1,0], [1,1,0,0],[1,1,1,1] ]
Data =np.array(Data)
```

```
n_datapoints = Data.shape[0]
```

```
n_dimensions = Data.shape[1]-1
```

```
w = 2*np.random.random_sample((n_dimensions)) - 1
b=np.random.random()
```

```
lr = 0.1
```

```
epoches = 50
```

```
for ep in range(epoches):
  for i in range(n_datapoints):
    net_input =np.dot(w,Data[i,0:n_dimensions]) + b

    A = net_input >= 0
    E = Data[i,n_dimensions] - A
    w = w + lr * E *(Data[i,0:n_dimensions].T)
    b= b +lr*E
    print("Epoc:",ep,"weights: ",w,"bias: ",b)
```

```
Epoc: 5 weights:  [-0.47859906  0.04774628 -0.02802778] bias:  -0.08646912340843416
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Epoc: 10 weights:  [ 0.02140094  0.04774628 -0.02802778] bias:  -0.28646912340843417
Epoc: 10 weights:  [0.12140094 0.14774628 0.07197222] bias:  -0.18646912340843416
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Epoc: 11 weights:  [ 0.12140094  0.04774628 -0.02802778] bias:  -0.28646912340843417
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Epoc: 11 weights:  [ 0.12140094  0.04774628 -0.02802778] bias:  -0.28646912340843417
Epoc: 11 weights:  [0.22140094 0.14774628 0.07197222] bias:  -0.18646912340843416
Epoc: 12 weights:  [0.22140094 0.14774628 0.07197222] bias:  -0.18646912340843416
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Epoc: 12 weights:  [ 0.22140094  0.04774628 -0.02802778] bias:  -0.28646912340843417
```

```
print("Final weights",w)
print("Final bias ",b)
```

```
Final weights [0.22140094 0.14774628 0.07197222]
Final bias  -0.3864691234084342
```

```
prediciton = (np.dot(Data[:,0:n_dimensions],w)+b)>=0
prediciton
```

```
array([False, False, False, False, False, False, False,  True])
```

```
Final=[]
for i in prediciton:
  if i==True:
    Final.append(1)
  else:
    Final.append(0)

Final
```

```
[0, 0, 0, 0, 0, 0, 0, 1]
```

```
#pTcrw4bw
#https://nirmauni.webex.com/recordingservice/sites/nirmauni/recording/04fe07c919cf103abf7c00505681f9de/playback
```

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