In [1]:

```
import numpy as np
import random
```

In [3]:

```
file = open("SLP_Sheet1.csv","r")
data = []
for line in file:
    cur = line.strip().split(',')
    data.append(cur)
```

In [5]:

```
no_of_fet = 2
no_of_cl = 2
```

In [7]:

```
X=[]
Y = []
random.shuffle(data)
for cur in data:
    u = [1]
    v = []
    for i in range(no_of_fet):
        u.append(float(cur[i]))
    for i in range(no_of_cl):
        v.append(float(cur[no_of_fet+i]))
    X.append(u)
    Y.append(v)
X = np.array(X)
Y = np.array(Y)
```

In [8]:

```
X.shape
```

Out[8]:

```
(160, 3)
```

In [9]:

```
Y.shape
```

Out[9]:

```
(160, 2)
```

In [16]:

```
def sigmoid(A):
    for i in range(A.shape[0]):
        for j in range(A.shape[1]):
            A[i][j] = 1/(1+np.exp(-A[i][j]))
    return A
```

In [17]:

```
def der_sig(A):
    for i in range(A.shape[0]):
        for j in range(A.shape[1]):
            A[i][j] = (-1*np.exp(-A[i][j]))/((1+np.exp(-A[i][j]))*(1+np.exp(-A
[i][j])))
    return A
```

In [20]:

```
def init_W():
    W = np.zeros((no_of_fet+1,no_of_cl))
    for i in range(W.shape[0]):
        for j in range(W.shape[1]):
            W[i][j] = random.random()
    return W
```

In [21]:

```
init_W()
```

Out[21]:

```
array([[0.26108817, 0.52852131],
       [0.63679086, 0.69223349],
       [0.9857764 , 0.56381918]])
```

In [36]:

```
def Correct_count(Y_new,Y):
    count = 0
    for i in range(Y.shape[0]):
        if(Y[i][0] == 1 and Y_new[i][0] >= Y_new[i][1]):
            count = count + 1
        if(Y[i][1] == 1 and Y_new[i][0] < Y_new[i][1]):
            count = count + 1
    #print("correct count = ",count)
    return count
```

In [37]:

```
def train(X,Y,ep,LR):
    W = init_W()
    for i in range(ep):
        Z = np.dot(X,W)
        Y_new = sigmoid(Z)
        correct =  Correct_count(Y_new,Y)
        if i%100 == 0: print("correct count at i = ",i," = ",correct)
        DA = Y_new - Y
        DZ = np.multiply(DA,der_sig(Z))
        DW = (1/X.shape[0])*np.dot(X.T,DZ)
        W = W + LR*DW
    return W
```

In [41]:
```
W_final = train(X,Y,5000,0.0035)
```

```
correct count at i =  0  =  85
correct count at i =  100  =  85
correct count at i =  200  =  85
correct count at i =  300  =  86
correct count at i =  400  =  86
correct count at i =  500  =  86
correct count at i =  600  =  86
correct count at i =  700  =  86
correct count at i =  800  =  86
correct count at i =  900  =  86
correct count at i =  1000  =  86
correct count at i =  1100  =  87
correct count at i =  1200  =  87
correct count at i =  1300  =  88
correct count at i =  1400  =  88
correct count at i =  1500  =  89
correct count at i =  1600  =  90
correct count at i =  1700  =  93
correct count at i =  1800  =  94
correct count at i =  1900  =  96
correct count at i =  2000  =  98
correct count at i =  2100  =  99
correct count at i =  2200  =  104
correct count at i =  2300  =  105
correct count at i =  2400  =  107
correct count at i =  2500  =  107
correct count at i =  2600  =  107
correct count at i =  2700  =  108
correct count at i =  2800  =  109
correct count at i =  2900  =  110
correct count at i =  3000  =  111
correct count at i =  3100  =  115
correct count at i =  3200  =  118
correct count at i =  3300  =  118
correct count at i =  3400  =  119
correct count at i =  3500  =  121
correct count at i =  3600  =  122
correct count at i =  3700  =  122
correct count at i =  3800  =  122
correct count at i =  3900  =  122
correct count at i =  4000  =  123
correct count at i =  4100  =  123
correct count at i =  4200  =  123
correct count at i =  4300  =  124
correct count at i =  4400  =  125
correct count at i =  4500  =  126
correct count at i =  4600  =  126
correct count at i =  4700  =  126
correct count at i =  4800  =  127
correct count at i =  4900  =  127
```