TP3

MULTI LAYER PERCEPTRON

Datos utilizados:

```
        #NEURONA1
        w0=0.9
        w1=0.7
        w2=0.5
        #NEURONA2
        w3=0.3
        w4=-0.9
        w5=-1
        #NEURONA3
        w6=0.8
        w7=0.35
        w8=0.1
        #NEURONA4
        w9=-0.23
        w10=-0.79
        w11=0.56
        #NEURONA5
        w12=0.6
        w13=-0.6
        w14=0.22
        #NEURONA6
        w15=-0.22
        w16=-0.55
        w17=0.31
        w18=-0.32
```

Codigo para la resolución del perceptron:

```
#NEURONA 1
        x1= (w0*entrada0) + (w1*entrada1) + (w2*entrada2)
        y1 = 1 / (1 + (math.exp(-x1)))
        error1 = SalidaDeseada - y1
        delta1 = y1*(1-y1)*error1

        deltaw0 = lr*entrada0*delta1
        w0 = w0 + deltaw0

        deltaw1 = lr*entrada1*delta1
        w1 = w1 + deltaw1

        deltaw2 = lr*entrada2*delta1
        w2 = w2 + deltaw2
```

```
        print(f"---NEURONA 1---\nSalida Real={y1}
\nw0={w0}\nw1={w1}\nw2={w2}")

        #NEURONA 2
        x2= (w3*entrada0) + (w4*entrada1) + (w4*entrada2)
        y2 = 1 / (1 + (math.exp(-x2)))
        error2 = SalidaDeseada - y2
        delta2 = y2*(1-y2)*error2

        deltaw3=lr*entrada0*delta2
        w3=w3 + deltaw3

        deltaw4=lr*entrada1*delta2
        w4=w4 + deltaw4

        deltaw5=lr*entrada0*delta2
        w5=w5 + deltaw5

        print(f"\n---NEURONA 2---\nSalida Real={y2}
\nw3={w3}\nw4={w4}\nw5={w5}")

        #NEURONA 3
        x3= (w6*entrada0 + w7*y1 + w8*y2)
        y3 = 1 / (1 + (math.exp(-x3)))
        error3 = SalidaDeseada - y3
        delta3 = y3*(1-y3)*error3

        deltaw6 = lr*entrada0*delta3
        w6= w6 + deltaw6

        deltaw7 = lr*y1*delta3
        w7= w7 + deltaw7

        deltaw8 = lr*y2*delta3
        w8= w8 + deltaw8

        print(f"\n---NEURONA 3---\nSalida Real={y3}
\nw6={w6}\nw7={w7}\nw8={w8}")

        #NEURONA 4
        x4 = (w9*entrada0 + w10*y1 + w11*y2)
        y4 = 1 / (1 + (math.exp(-x4)))
        error4 = SalidaDeseada - y4
        delta4 = y4*(1-y4)*error4

        deltaw9 = lr*entrada0*delta4
        w9= w9 + deltaw9
```

```
        deltaw10 = lr*y1*delta4
        w10= w10 + deltaw10

        deltaw11 = lr*y2*delta4
        w11= w11 + deltaw11

        print(f"\n---NEURONA 4---\nSalida Real={y4}
\nw9={w9}\nw10={w10}\nw11={w11}")

        #NEURONA 5
        x5 = (w12*entrada0 + w13*y1 + w14*y2)
        y5 = 1 / (1 + (math.exp(-x5)))
        error5 = SalidaDeseada - y5
        delta5 = y5*(1-y5)*error5

        deltaw12 = lr*entrada0*delta5
        w12= w12 + deltaw12

        deltaw13 = lr*y1*delta5
        w13= w13 + deltaw13

        deltaw14 = lr*y2*delta5
        w14= w14 + deltaw14

        print(f"\n---NEURONA 5---\nSalida Real={y5}
\nw12={w12}\nw13={w13}\nw14={w14}")

        #NEURONA 6
        x6 = (w15*entrada0 + w16*y3 + w17*y4 + w18*y5)
        y6 = 1 / (1 + (math.exp(-x6)))
        error6 = SalidaDeseada - y6
        delta6 = y6*(1-y6)*error6

        deltaw15 = lr*entrada0*delta6
        w15= w15 + deltaw15

        deltaw16 = lr*y3*delta6
        w16= w16 + deltaw16

        deltaw17 = lr*y4*delta6
        w17= w17 + deltaw17

        deltaw18 = lr*y5*delta6
        w18= w18 + deltaw18

        print(f"\n---NEURONA 6---\nSalida Real={y6}
\nw15={w15}\nw16={w16}\nw17={w17}\nw18={w18}")
```

Resultados obtenidos:

```
---NEURONA 1---
Salida Real=0.7109495026250039
w0=0.8853899658705733
w1=0.7
w2=0.5

---NEURONA 2---
Salida Real=0.5744425168116 59
w3=0.2859572752176839
w4=-0.9
w5=-1.014042724782316

---NEURONA 3---
Salida Real=0.7514342989333093
w6=0.7859646505517442
w7=0.3400215752905944
w8=0.09193749853861283

---NEURONA 4---
Salida Real=0.3846251672860635
w9=-0.239103641082257
w10=-0.7964722290995072
w11=0.5547704815045583

---NEURONA 5---
Salida Real=0.5743954951013756
w12=0.5859580227050167
w13=-0.6099831367737398
w14=0.2119336912216577

---NEURONA 6---
Salida Real=0.3322865043794343
w15=-0.22737251322366095
w16=-0.5555399593055983
w17=0.3071643458680307
w18=-0.3242347383832462
```

Comprobé los resultados con Excel y mis compañeros:

NEURONA 1			NEURONA 2			NEURONA 3		
x1=	0,9		x2=	0,3		x3=	1,10627658	
Y=	0,710949503	Salida real	Y=	0,57444252	Salida real	Y=	0,7514343	Salida real
Error=	-0,710949503		Error=	-0,5744425		Error=	-0,7514343	
δ=	-0,14610034		δ=	-0,1404272		δ=	-0,1403535	
Δw0=	-0,01461003		Δw3=	-0,0140427		Δw6=	-0,0140353	
w0=	0,885389966		w3=	0,28595728		w6=	0,78596465	
Δw1=	0		Δw4=	0		Δw7=	-0,0099784	
w1=	0,7		w4=	-0,9		w7=	0,34002158	
Δw2=	0		Δw5=	0		Δw8=	-0,0080625	
w2=	0,5		w5=	-1		w8=	0,0919375	
NEURONA 4			NEURONA 5			NEURONA 6		
x4=	-0,4699623		x5=	0,29980765		x6=	-0,6978616	
Y=	0,384625167	Salida real	Y=	0,5743955	Salida real	Y=	0,3322865	Salida real
Error=	-0,384625167		Error=	-0,5743955		Error=	-0,3322865	
δ=	-0,09103641		δ=	-0,1404198		δ=	-0,0737251	
Δw9=	-0,00910364		Δw12=	-0,014042		Δw15=	-0,0073725	
w9=	-0,23910364		w12=	0,58595802		w15=	-0,2273725	
Δw10=	-0,00647223		Δw13=	-0,0099831		Δw16=	-0,00554	
w10=	-0,79647223		w13=	-0,6099831		w16=	-0,55554	
Δw11=	-0,00522952		Δw14=	-0,0080663		Δw17=	-0,0028357	
w11=	0,554770482		w14=	0,21193369		w17=	0,30716435	
						Δw18=	-0,0042347	
						w18=	-0,3242347	