

MEMORIA PRÁCTICA 2 SIN

César Martínez Chico 3G2

Al ejecutar el comando `./experiment.py #FICHERO# '0.1 1 10 100 1000 10000' '0.1 1 10 100 1000 10000 100000'`

Siendo #FICHERO# el nombre del dataset, los diferentes resultados han sido:

(Téngase en cuenta que, en el print, para los valores float he decidido que solo aparezca un decimal. Aunque no especifican que esto deba ser así, lo he hecho por el pdf, que los resultados se dan redondeando al primer decimal))

Para el dataset

OCR_14x14:

```
PS C:\Users\César\TODO\UNIVERSIDAD\SIN\practicas\practica2> ./experiment.py OCR_14x14 '0.1 1 10 100 1000 10000' '0.1 1 10 100 1000 10000 100000'
```

#	a	b	E	k	Ete	Ete (%)	Ite(%)
#-----							
0.1	0.1	0	11	14	4.7	[2.3, 7.1]	
0.1	1.0	0	12	18	6.0	[3.3, 8.7]	
0.1	10.0	0	17	14	4.7	[2.3, 7.1]	
0.1	100.0	0	123	14	4.7	[2.3, 7.1]	
0.1	1000.0	162	200	11	3.7	[1.5, 5.8]	
0.1	10000.0	538	200	29	9.7	[6.3, 13.0]	
0.1	100000.0		700	200	141	47.0 [41.4, 52.6]	
1.0	0.1	0	12	17	5.7	[3.1, 8.3]	
1.0	1.0	0	11	14	4.7	[2.3, 7.1]	
1.0	10.0	0	12	18	6.0	[3.3, 8.7]	
1.0	100.0	0	17	14	4.7	[2.3, 7.1]	
1.0	1000.0	0	123	14	4.7	[2.3, 7.1]	
1.0	10000.0	162	200	11	3.7	[1.5, 5.8]	
1.0	100000.0		538	200	29	9.7 [6.3, 13.0]	
10.0	0.1	0	10	15	5.0	[2.5, 7.5]	
10.0	1.0	0	12	17	5.7	[3.1, 8.3]	
10.0	10.0	0	11	14	4.7	[2.3, 7.1]	
10.0	100.0	0	12	18	6.0	[3.3, 8.7]	
10.0	1000.0	0	17	14	4.7	[2.3, 7.1]	
10.0	10000.0	0	123	14	4.7	[2.3, 7.1]	
10.0	100000.0		162	200	11	3.7 [1.5, 5.8]	
100.0	0.1	0	10	15	5.0	[2.5, 7.5]	
100.0	1.0	0	10	15	5.0	[2.5, 7.5]	
100.0	10.0	0	12	17	5.7	[3.1, 8.3]	
100.0	100.0	0	11	14	4.7	[2.3, 7.1]	
100.0	1000.0	0	12	18	6.0	[3.3, 8.7]	
100.0	10000.0	0	17	14	4.7	[2.3, 7.1]	
100.0	100000.0		0	123	14	4.7 [2.3, 7.1]	
1000.0	0.1	0	10	15	5.0	[2.5, 7.5]	
1000.0	1.0	0	10	15	5.0	[2.5, 7.5]	
1000.0	10.0	0	10	15	5.0	[2.5, 7.5]	
1000.0	100.0	0	12	17	5.7	[3.1, 8.3]	
1000.0	1000.0	0	11	14	4.7	[2.3, 7.1]	
1000.0	10000.0	0	12	18	6.0	[3.3, 8.7]	
1000.0	100000.0		0	17	14	4.7 [2.3, 7.1]	
10000.0	0.1	0	10	15	5.0	[2.5, 7.5]	
10000.0	1.0	0	10	15	5.0	[2.5, 7.5]	
10000.0	10.0	0	10	15	5.0	[2.5, 7.5]	
10000.0	100.0	0	10	15	5.0	[2.5, 7.5]	
10000.0	1000.0	0	12	17	5.7	[3.1, 8.3]	
10000.0	10000.0	0	11	14	4.7	[2.3, 7.1]	
10000.0	100000.0		0	12	18	6.0 [3.3, 8.7]	

EXPRESSIONS:

```
PS C:\Users\César\TODO\UNIVERSIDAD\SIN\practicas\practica2> ./experiment.py expressions '0.1 1 10 100 1000 10000' '0.1 1 10 100 1000 10000 100000'
# a b E k Ete Ete (%) Ite(%)
#-----
0.1 0.1 0 50 4 6.0 [0.3, 11.6]
0.1 1.0 0 50 4 6.0 [0.3, 11.6]
0.1 10.0 0 50 4 6.0 [0.3, 11.6]
0.1 100.0 0 50 4 6.0 [0.3, 11.6]
0.1 1000.0 0 63 6 9.0 [2.1, 15.8]
0.1 10000.0 0 45 4 6.0 [0.3, 11.6]
0.1 100000.0 0 66 7 10.4 [3.1, 17.8]
1.0 0.1 0 50 4 6.0 [0.3, 11.6]
1.0 1.0 0 50 4 6.0 [0.3, 11.6]
1.0 10.0 0 50 4 6.0 [0.3, 11.6]
1.0 100.0 0 50 4 6.0 [0.3, 11.6]
1.0 1000.0 0 50 4 6.0 [0.3, 11.6]
1.0 10000.0 0 63 6 9.0 [2.1, 15.8]
1.0 100000.0 0 45 4 6.0 [0.3, 11.6]
10.0 0.1 0 50 4 6.0 [0.3, 11.6]
10.0 1.0 0 50 4 6.0 [0.3, 11.6]
10.0 10.0 0 50 4 6.0 [0.3, 11.6]
10.0 100.0 0 50 4 6.0 [0.3, 11.6]
10.0 1000.0 0 50 4 6.0 [0.3, 11.6]
10.0 10000.0 0 50 4 6.0 [0.3, 11.6]
10.0 100000.0 0 63 6 9.0 [2.1, 15.8]
100.0 0.1 0 50 4 6.0 [0.3, 11.6]
100.0 1.0 0 50 4 6.0 [0.3, 11.6]
100.0 10.0 0 50 4 6.0 [0.3, 11.6]
100.0 100.0 0 50 4 6.0 [0.3, 11.6]
100.0 1000.0 0 50 4 6.0 [0.3, 11.6]
100.0 10000.0 0 50 4 6.0 [0.3, 11.6]
100.0 100000.0 0 50 4 6.0 [0.3, 11.6]
1000.0 0.1 0 50 4 6.0 [0.3, 11.6]
1000.0 1.0 0 50 4 6.0 [0.3, 11.6]
1000.0 10.0 0 50 4 6.0 [0.3, 11.6]
1000.0 100.0 0 50 4 6.0 [0.3, 11.6]
1000.0 1000.0 0 50 4 6.0 [0.3, 11.6]
1000.0 10000.0 0 50 4 6.0 [0.3, 11.6]
1000.0 100000.0 0 50 4 6.0 [0.3, 11.6]
10000.0 0.1 0 50 4 6.0 [0.3, 11.6]
10000.0 1.0 0 50 4 6.0 [0.3, 11.6]
10000.0 10.0 0 50 4 6.0 [0.3, 11.6]
10000.0 100.0 0 50 4 6.0 [0.3, 11.6]
10000.0 1000.0 0 50 4 6.0 [0.3, 11.6]
10000.0 10000.0 0 50 4 6.0 [0.3, 11.6]
10000.0 100000.0 0 50 4 6.0 [0.3, 11.6]
```

GAUSS2D:

```
PS C:\Users\César\TODO\UNIVERSIDAD\SIN\practicas\practica2> ./experiment.py gauss2D '0.1 1 10 100 1000 10000' '0.1 1 10 100 1000 10000 100000'
# a b E k Ete Ete (%) Ite(%)
#-----
0.1 0.1 562 200 445 37.1 [34.4, 39.8]
0.1 1.0 697 200 260 21.7 [19.3, 24.0]
0.1 10.0 806 200 141 11.8 [9.9, 13.6]
0.1 100.0 824 200 126 10.5 [8.8, 12.2]
0.1 1000.0 849 200 126 10.5 [8.8, 12.2]
0.1 10000.0 1173 200 153 12.8 [10.9, 14.6]
0.1 100000.0 1691 200 296 24.7 [22.2, 27.1]
1.0 0.1 517 200 418 34.8 [32.1, 37.5]
1.0 1.0 562 200 445 37.1 [34.4, 39.8]
1.0 10.0 697 200 260 21.7 [19.3, 24.0]
1.0 100.0 806 200 141 11.8 [9.9, 13.6]
1.0 1000.0 824 200 126 10.5 [8.8, 12.2]
1.0 10000.0 849 200 126 10.5 [8.8, 12.2]
1.0 100000.0 1173 200 153 12.8 [10.9, 14.6]
10.0 0.1 509 200 339 28.2 [25.7, 30.8]
10.0 1.0 517 200 418 34.8 [32.1, 37.5]
10.0 10.0 562 200 445 37.1 [34.4, 39.8]
10.0 100.0 697 200 260 21.7 [19.3, 24.0]
10.0 1000.0 806 200 141 11.8 [9.9, 13.6]
10.0 10000.0 824 200 126 10.5 [8.8, 12.2]
10.0 100000.0 849 200 126 10.5 [8.8, 12.2]
100.0 0.1 519 200 341 28.4 [25.9, 31.0]
100.0 1.0 509 200 339 28.2 [25.7, 30.8]
100.0 10.0 517 200 418 34.8 [32.1, 37.5]
100.0 100.0 562 200 445 37.1 [34.4, 39.8]
100.0 1000.0 697 200 260 21.7 [19.3, 24.0]
100.0 10000.0 806 200 141 11.8 [9.9, 13.6]
100.0 100000.0 824 200 126 10.5 [8.8, 12.2]
1000.0 0.1 529 200 485 40.4 [37.6, 43.2]
1000.0 1.0 519 200 341 28.4 [25.9, 31.0]
1000.0 10.0 509 200 339 28.2 [25.7, 30.8]
1000.0 100.0 517 200 418 34.8 [32.1, 37.5]
1000.0 1000.0 562 200 445 37.1 [34.4, 39.8]
1000.0 10000.0 697 200 260 21.7 [19.3, 24.0]
1000.0 100000.0 806 200 141 11.8 [9.9, 13.6]
10000.0 0.1 528 200 495 41.2 [38.5, 44.0]
10000.0 1.0 529 200 485 40.4 [37.6, 43.2]
10000.0 10.0 519 200 341 28.4 [25.9, 31.0]
10000.0 100.0 509 200 339 28.2 [25.7, 30.8]
10000.0 1000.0 517 200 418 34.8 [32.1, 37.5]
10000.0 10000.0 562 200 445 37.1 [34.4, 39.8]
10000.0 100000.0 697 200 260 21.7 [19.3, 24.0]
```

GENDER:

```

PS C:\Users\César\TODO\UNIVERSIDAD\SIN\practicas\practica2> ./experiment.py gender '0.1 1 10 100 1000 10000' '0.1 1 10 100 1000 10000 100000'
# a b E k Ete Ete (%) Ite(%)
#-----
0.1 0.1 0 60 39 4.6 [3.2, 6.0]
0.1 1.0 0 60 39 4.6 [3.2, 6.0]
0.1 10.0 0 70 49 5.8 [4.2, 7.3]
0.1 100.0 0 70 49 5.8 [4.2, 7.3]
0.1 1000.0 0 58 44 5.2 [3.7, 6.7]
0.1 10000.0 0 66 43 5.1 [3.6, 6.5]
0.1 100000.0 0 78 45 5.3 [3.8, 6.8]
1.0 0.1 0 60 39 4.6 [3.2, 6.0]
1.0 1.0 0 60 39 4.6 [3.2, 6.0]
1.0 10.0 0 60 39 4.6 [3.2, 6.0]
1.0 100.0 0 70 49 5.8 [4.2, 7.3]
1.0 1000.0 0 70 49 5.8 [4.2, 7.3]
1.0 10000.0 0 58 44 5.2 [3.7, 6.7]
1.0 100000.0 0 66 43 5.1 [3.6, 6.5]
10.0 0.1 0 60 39 4.6 [3.2, 6.0]
10.0 1.0 0 60 39 4.6 [3.2, 6.0]
10.0 10.0 0 60 39 4.6 [3.2, 6.0]
10.0 100.0 0 60 39 4.6 [3.2, 6.0]
10.0 1000.0 0 70 49 5.8 [4.2, 7.3]
10.0 10000.0 0 70 49 5.8 [4.2, 7.3]
10.0 100000.0 0 58 44 5.2 [3.7, 6.7]
100.0 0.1 0 60 39 4.6 [3.2, 6.0]
100.0 1.0 0 60 39 4.6 [3.2, 6.0]
100.0 10.0 0 60 39 4.6 [3.2, 6.0]
100.0 100.0 0 60 39 4.6 [3.2, 6.0]
100.0 1000.0 0 60 39 4.6 [3.2, 6.0]
100.0 10000.0 0 70 49 5.8 [4.2, 7.3]
100.0 100000.0 0 70 49 5.8 [4.2, 7.3]
1000.0 0.1 0 60 39 4.6 [3.2, 6.0]
1000.0 1.0 0 60 39 4.6 [3.2, 6.0]
1000.0 10.0 0 60 39 4.6 [3.2, 6.0]
1000.0 100.0 0 60 39 4.6 [3.2, 6.0]
1000.0 1000.0 0 60 39 4.6 [3.2, 6.0]
1000.0 10000.0 0 70 49 5.8 [4.2, 7.3]
1000.0 100000.0 0 70 49 5.8 [4.2, 7.3]
10000.0 0.1 0 60 39 4.6 [3.2, 6.0]
10000.0 1.0 0 60 39 4.6 [3.2, 6.0]
10000.0 10.0 0 60 39 4.6 [3.2, 6.0]
10000.0 100.0 0 60 39 4.6 [3.2, 6.0]
10000.0 1000.0 0 60 39 4.6 [3.2, 6.0]
10000.0 10000.0 0 60 39 4.6 [3.2, 6.0]
10000.0 100000.0 0 60 39 4.6 [3.2, 6.0]

```

VIDEOS:

```

PS C:\Users\César\TODO\UNIVERSIDAD\SIN\practicas\practica2> ./experiment.py videos '0.1 1 10 100 1000 10000' '0.1 1 10 100 1000 10000 100000'
# a b E k Ete Ete (%) Ite(%)
#-----
0.1 0.1 1644 200 833 34.8 [32.9, 36.7]
0.1 1.0 2788 200 647 27.0 [25.2, 28.8]
0.1 10.0 4424 200 673 28.1 [26.3, 29.9]
0.1 100.0 5565 200 1140 47.6 [45.6, 49.6]
0.1 1000.0 5566 200 1171 48.9 [46.9, 50.9]
0.1 10000.0 5590 200 1171 48.9 [46.9, 50.9]
0.1 100000.0 5590 200 1171 48.9 [46.9, 50.9]
1.0 0.1 1150 200 732 30.6 [28.7, 32.4]
1.0 1.0 1644 200 833 34.8 [32.9, 36.7]
1.0 10.0 2788 200 647 27.0 [25.2, 28.8]
1.0 100.0 4424 200 673 28.1 [26.3, 29.9]
1.0 1000.0 5565 200 1140 47.6 [45.6, 49.6]
1.0 10000.0 5566 200 1171 48.9 [46.9, 50.9]
1.0 100000.0 5590 200 1171 48.9 [46.9, 50.9]
10.0 0.1 1052 200 813 33.9 [32.0, 35.8]
10.0 1.0 1150 200 732 30.6 [28.7, 32.4]
10.0 10.0 1644 200 833 34.8 [32.9, 36.7]
10.0 100.0 2788 200 647 27.0 [25.2, 28.8]
10.0 1000.0 4424 200 673 28.1 [26.3, 29.9]
10.0 10000.0 5565 200 1140 47.6 [45.6, 49.6]
10.0 100000.0 5566 200 1171 48.9 [46.9, 50.9]
100.0 0.1 1032 200 828 34.6 [32.7, 36.5]
100.0 1.0 1052 200 813 33.9 [32.0, 35.8]
100.0 10.0 1150 200 732 30.6 [28.7, 32.4]
100.0 100.0 1644 200 833 34.8 [32.9, 36.7]
100.0 1000.0 2788 200 647 27.0 [25.2, 28.8]
100.0 10000.0 4424 200 673 28.1 [26.3, 29.9]
100.0 100000.0 5565 200 1140 47.6 [45.6, 49.6]
1000.0 0.1 1026 200 831 34.7 [32.8, 36.6]
1000.0 1.0 1032 200 828 34.6 [32.7, 36.5]
1000.0 10.0 1052 200 813 33.9 [32.0, 35.8]
1000.0 100.0 1150 200 732 30.6 [28.7, 32.4]
1000.0 1000.0 1644 200 833 34.8 [32.9, 36.7]
1000.0 10000.0 2788 200 647 27.0 [25.2, 28.8]
1000.0 100000.0 4424 200 673 28.1 [26.3, 29.9]
10000.0 0.1 1020 200 826 34.5 [32.6, 36.4]
10000.0 1.0 1026 200 831 34.7 [32.8, 36.6]
10000.0 10.0 1032 200 828 34.6 [32.7, 36.5]
10000.0 100.0 1052 200 813 33.9 [32.0, 35.8]
10000.0 1000.0 1150 200 732 30.6 [28.7, 32.4]
10000.0 10000.0 1644 200 833 34.8 [32.9, 36.7]
10000.0 100000.0 2788 200 647 27.0 [25.2, 28.8]

```

Y la tabla:

TAREA	ETE(%)	Ite(%)	a	b
OCR_14x14	4.7	[2.3, 7.1]	10000.0	10000.0
expressions	6.0	[0.3, 11.6]	10000.0	100000.0
gauss2D	10.5	[8.8, 12.2]	100.0	100000.0
gender	4.6	[3.2, 6.0]	10000.0	100000.0
videos	27.0	[25.2, 28.8]	10000.0	100000.0

Y, por último, el código de experiment.py, por si acaso:

```
experiment.py > ...
1  import sys
2  import math
3  import numpy as np
4  from perceptron import perceptron
5  from confus import confus
6  from linmach import linmach
7
8  if len(sys.argv) != 4:
9      print('Usage: %s <data> <alphas> <bs>' % sys.argv[0])
10     sys.exit(1)
11
12
13 data = np.loadtxt(sys.argv[1])
14 alphas = np.fromstring(sys.argv[2], sep=' ')
15 bs = np.fromstring(sys.argv[3], sep=' ')
16
17 #
18 #organizar datos
19 N,L=data.shape;
20 D=L-1;
21 labs=np.unique(data[:,L-1]);
22 C=labs.size;
23 #dividir entrenamiento y test
24 np.random.seed(23);
25 perm=np.random.permutation(N);
26 data=data[perm];
27
28 NTr=int(round(.7*N));
29 train=data[:NTr,:];
30
31 M=N-NTr;
32 test=data[NTr,:]; #los datos que usaremos en el test iran desde la fila Ntr en adelante, y usamos toda la columna
33
34 print('#      a      b      E      k      Ete      Ete (%)      Ite(%)');
35 print('#-----');
36 #
37 for a in alphas:
38     for b in bs:
39         w,E,k=perceptron(train,b,a);
40         r1=np.zeros((M,1));
41         for m in range(M):
42             tem=np.concatenate(([1],test[m,:D]));
43             r1[m]=labs[linmach(w,tem)];
44         nerr,m=confus(test[:,L-1].reshape(M,1),r1);
45         per = nerr/M;
46
47         nerr,m=confus(test[:,L-1].reshape(M,1),r1);
48         per = nerr/M;
49         nerrPorcentaje = 1.96*math.sqrt(per*(1-per)/M);
50         I = (per-nerrPorcentaje, per + nerrPorcentaje);
51         print('%8.1f \t%3.1f\t%3d\t%3d\t%3d\t%3.1f\t[%3.1f, %3.1f]' % (a,b, E,k,nerr,per*100,(per-nerrPorcentaje)*100, (per+nerrPorcentaje)*100))
```