

cross_entropy

February 26, 2019

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In [2]: import numpy as np
import matplotlib.pyplot as plt
%matplotlib inline

In [3]: def draw(x1,x2):
    ln=plt.plot(x1,x2)
def sigmoid(score):
    return (1/(1+np.exp(-score)))
def calculate_error(line_parameters,points,y):
    n=points.shape[0]
    print("n \n",n)
    p=sigmoid(points*line_parameters)
    print("p : \n",p)
    ln_p=np.log(p).T#ln(p)
    print("ln(p) transponced\n",ln_p)
    ln_1_less_p=np.log(1-p).T#ln(1-p)
    print("ln(1-p) transponced\n",ln_1_less_p)
    cross_entropy=-(1/n)*(ln_p*y+ln_1_less_p*(1-y))
    print("cross entropy",cross_entropy)
    return cross_entropy

In [6]: n_pts=10
np.random.seed(0)
bias=np.ones(n_pts)
top_region=np.array([np.random.normal(10,2,n_pts),np.random.normal(12,2,n_pts),bias]).T
bottom_region=np.array([np.random.normal(5,2,n_pts),np.random.normal(6,2,n_pts),bias]).T
all_points=np.vstack((top_region,bottom_region))
print("all points \n",all_points)
w1=-0.1
w2=-0.5
b=0
line_parameters=np.matrix([w1,w2,b]).T
print("Line parameters \n",line_parameters)
x1=np.array([bottom_region[:,0].min(),top_region[:,0].max()])
print("x1 \n",x1)
x2=-b/w2+(x1*(-w1/w2))
print("x2 \n",x2)
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y=np.array([np.zeros(n_pts),np.ones(n_pts)]).reshape(n_pts*2,1)
print("y \n",y)
_,ax=plt.subplots(figsize=(4,4))
ax.scatter(top_region[:,0],top_region[:,1],color="r")
ax.scatter(bottom_region[:,0],bottom_region[:,1],color="b")
draw(x1,x2)
plt.show()
print(calculate_error(line_parameters,all_points,y))

all points
[[13.52810469 12.28808714 1.      ]
 [10.80031442 14.90854701 1.      ]
 [11.95747597 13.52207545 1.      ]
 [14.4817864  12.24335003 1.      ]
 [13.73511598 12.88772647 1.      ]
 [ 8.04544424 12.66734865 1.      ]
 [11.90017684 14.98815815 1.      ]
 [ 9.69728558 11.58968347 1.      ]
 [ 9.7935623  12.6261354  1.      ]
 [10.821197   10.29180852 1.      ]
 [-0.10597963  6.30989485 1.      ]
 [ 6.30723719  6.75632504 1.      ]
 [ 6.7288724   4.2244285  1.      ]
 [ 3.51566996  2.03840706 1.      ]
 [ 9.53950925  5.3041757  1.      ]
 [ 2.09126865  6.31269794 1.      ]
 [ 5.09151703  8.46058136 1.      ]
 [ 4.6256323   8.4047597  1.      ]
 [ 8.06555843  5.22534637 1.      ]
 [ 7.93871754  5.3953945  1.      ]]

Line parameters
[[-0.1]
 [-0.5]
 [ 0.  ]]

x1
[-0.10597963 14.4817864 ]

x2
[ 0.02119593 -2.89635728]

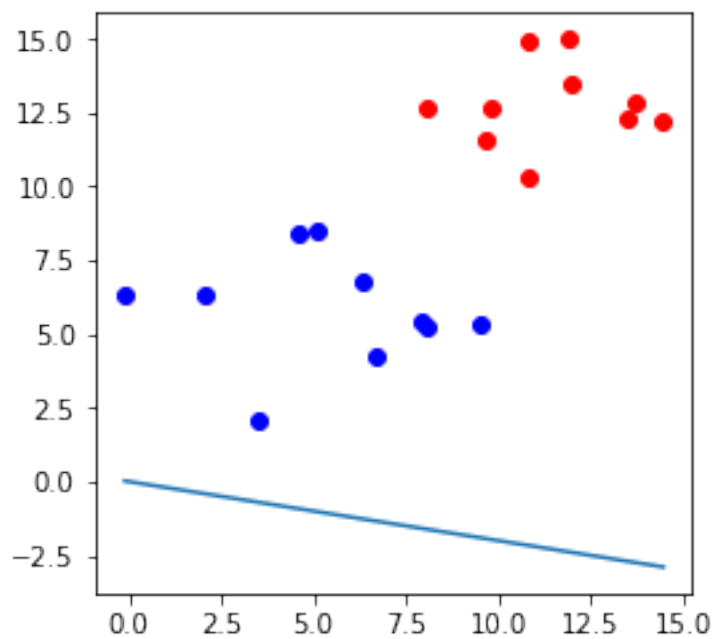
y
[[0.]
 [0.]
 [0.]
 [0.]
 [0.]
 [0.]
 [0.]
 [0.]
 [0.]

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[0.]
[1.]
[1.]
[1.]
[1.]
[1.]
[1.]
[1.]
[1.]
[1.]
[1.]

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n
20
p :
[[5.54519429e-04]
[1.96568117e-04]
[3.50154687e-04]
[5.15502043e-04]
[4.02515309e-04]
[7.93535245e-04]
[1.69227601e-04]
[1.15261319e-03]
[6.80213134e-04]
[1.96946103e-03]

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[4.13145034e-02]
[1.78299254e-02]
[5.81345931e-02]
[2.02495385e-01]
[2.64410983e-02]
[3.33920275e-02]
[8.66773384e-03]
[9.33188010e-03]
[3.16998849e-02]
[2.95530724e-02]]
ln(p) transponced
[[-7.49740871 -8.53450154 -7.95713554 -7.57036929 -7.81777743 -7.1390126
-8.684266 -6.76572357 -7.29310438 -6.22999536 -3.18654167 -4.02687703
-2.84499439 -1.59703818 -3.63283573 -3.39943811 -4.7481479 -4.67431877
-3.45144223 -3.52156757]]
ln(1-p) transponced
[[-5.54673231e-04 -1.96587439e-04 -3.50216006e-04 -5.15634960e-04
-4.02596340e-04 -7.93850261e-04 -1.69241921e-04 -1.15327796e-03
-6.80444584e-04 -1.97140297e-03 -4.21922072e-02 -1.79907935e-02
-5.98928947e-02 -2.26267657e-01 -2.67969509e-02 -3.39622716e-02
-8.70551714e-03 -9.37569488e-03 -3.22132035e-02 -2.99985635e-02]]
cross entropy [[1.75449948]]
[[1.75449948]]

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