perceptron

November 10, 2024

[2]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

[3]:
```
def predicted(x1,x2,x3,x4,x5,x6,x7,x8,w1,w2,w3,w4,w5,w6,w7,w8):
    s=x1*w1+x2*w2+x3*w3+x4*w4+x5*w5+x6*w6+x7*w7+x8*w8
    if s>=0.6:
        return 1
    else:
        return 0
```

[4]:
```
def error(x1,x2,x3,x4,x5,x6,x7,x8,w1,w2,w3,w4,w5,w6,w7,w8,y):
    return y-predicted(x1,x2,x3,x4,x5,x6,x7,x8,w1,w2,w3,w4,w5,w6,w7,w8)
```

[5]:
```
def lossfun(x1,x2,x3,x4,x5,x6,x7,x8,w1,w2,w3,w4,w5,w6,w7,w8,y):
    sum=0
    for i in range(len(x1)):
        ␣
 ↪sum=sum+error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i])
    return sum
```

[6]:
```
def training(x1,x2,x3,x4,x5,x6,x7,x8,y,lr,iw1,iw2,iw3,iw4,iw5,iw6,iw7,iw8):
    w1=iw1
    w2=iw2
    w3=iw3
    w4=iw4
    w5=iw5
    w6=iw6
    w7=iw7
    w8=iw8
    losslist=[]
    for epoch in (range(200)):
        loss=lossfun(x1,x2,x3,x4,x5,x6,x7,x8,w1,w2,w3,w4,w5,w6,w7,w8,y)
        losslist.append(loss)
        for i in range(len(x1)):
            ␣
 ↪w1=w1+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
```

```
            ␣
↪w2=w2+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
            ␣
↪w3=w3+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
            ␣
↪w4=w4+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
            ␣
↪w5=w5+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
            ␣
↪w6=w6+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
            ␣
↪w7=w7+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
            ␣
↪w8=w8+lr*error(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8,y[i]
    return w1,w2,w3,w4,w5,w6,w7,w8,losslist
```

[7]:
```
def linepoints(x1,w1,w2,w3,w4,w5,w6,w7,w8,th):
    x2=[]
    for i in range(len(x1)):
        x2.append((0.
↪5-x1[i]*w1-x3[i]*w3-x4[i]*w4-x5[i]*w5-x6[i]*w6-x7[i]*w7-x8[i]*w8)/w2)
    return x2
```

[9]:
```
df = pd.read_csv('diabetes.csv')
```

[10]:
```
df
```

[10]:

	Pregnancies	Glucose	BloodPressure	SkinThickness	Insulin	BMI	\
0	6	148	72	35	0	33.6	
1	1	85	66	29	0	26.6	
2	8	183	64	0	0	23.3	
3	1	89	66	23	94	28.1	
4	0	137	40	35	168	43.1	
..	…	…	…	…	…	…	
763	10	101	76	48	180	32.9	
764	2	122	70	27	0	36.8	
765	5	121	72	23	112	26.2	
766	1	126	60	0	0	30.1	
767	1	93	70	31	0	30.4	

	DiabetesPedigreeFunction	Age	Outcome
0	0.627	50	1
1	0.351	31	0
2	0.672	32	1
3	0.167	21	0
4	2.288	33	1

```
..                          …  …       …
763                     0.171   63         0
764                     0.340   27         0
765                     0.245   30         0
766                     0.349   47         1
767                     0.315   23         0

[768 rows x 9 columns]
```

[13]:
```
x1 = df['Pregnancies'].values
x2 = df['Glucose'].values
x3 = df['BloodPressure'].values
x4 = df['SkinThickness'].values
x5 = df['Insulin'].values
x6 = df['BMI'].values
x7 = df['DiabetesPedigreeFunction'].values
x8 = df['Age'].values
```

[14]:
```
y = df['Outcome'].values
```

[15]:
```
w1,w2,w3,w4,w5,w6,w7,w8,losses = training(x1,x2,x3,x4,x5,x6,x7,x8,y,0.001,0.2,0.
↪11,0.1,0.2,0.1,0.2,0.1,0.2)
```

[16]:
```
print(w1,w2,w3,w4,w5,w6,w7,w8)
```

```
1.3950000000000922 0.1630000000000326 -0.30599999999997785 0.18300000000000058
-0.07600000000000671 0.14769999999999867 0.10680800000000208 -0.2860000000000421
```

[17]:
```
for i in range(len(x1)):
    ␣
↪print(predicted(x1[i],x2[i],x3[i],x4[i],x5[i],x6[i],x7[i],x8[i],w1,w2,w3,w4,w5,w6,w7,w8))
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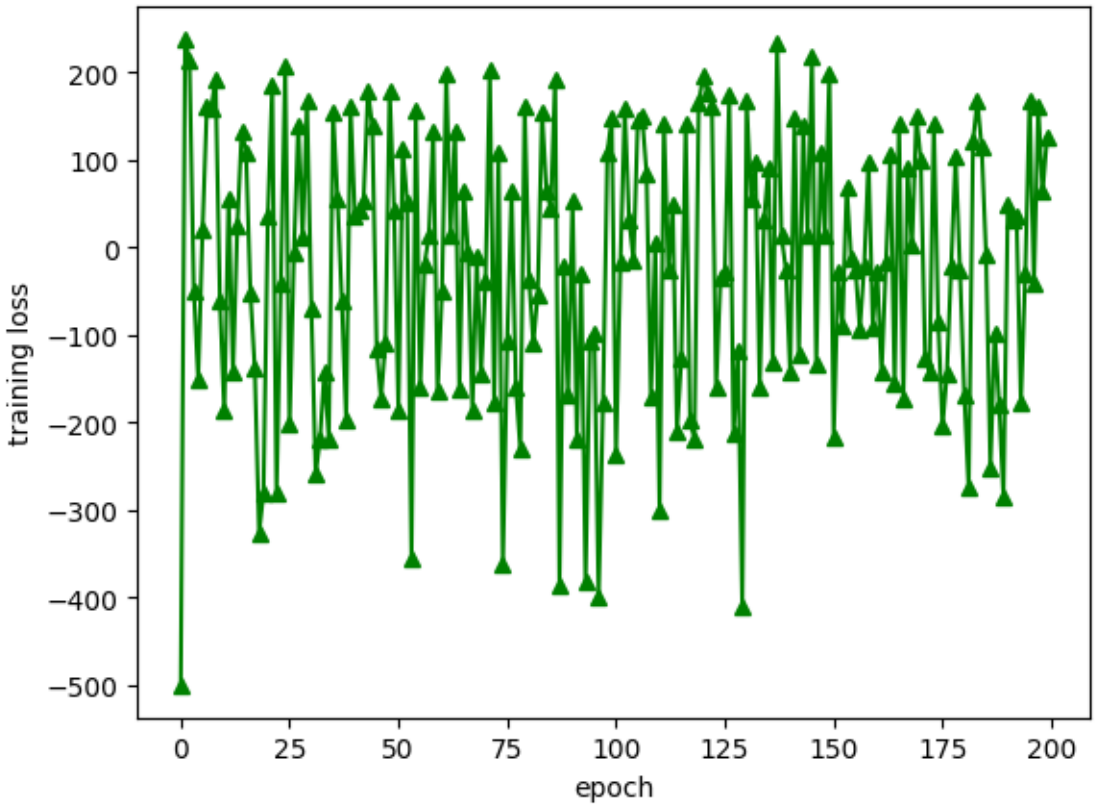
[18]:
```
epochs=[x for x in range(len(losses))]
```

[23]:
```
plt.plot(epochs,losses,color='g',marker='^')
plt.xlabel('epoch')
plt.ylabel('training loss')
plt.show()
```



[24]:
```
print(losses)
```

```
[-500, 238, 214, -49, -150, 20, 161, 159, 192, -61, -187, 55, -143, 25, 133,
109, -52, -138, -326, -280, 35, 185, -281, -41, 208, -202, -6, 140, 11, 167,
-69, -259, -218, -142, -218, 154, 56, -61, -197, 162, 36, 42, 54, 178, 139,
-116, -172, -110, 179, 43, -185, 112, 52, -356, 156, -160, -19, 13, 133, -164,
-51, 198, 14, 133, -163, 65, -5, -185, -11, -144, -40, 202, -177, 109, -362,
-107, 65, -160, -230, 162, -36, -109, -54, 154, 65, 44, 191, -385, -22, -168,
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146, 149, 85, -171, 5, -301, 142, -25, 48, -210, -126, 141, -198, -219, 166,
195, 177, 162, -160, -35, -27, 174, -212, -117, -410, 167, 56, 98, -160, 32, 91,
-131, 233, 13, -25, -143, 147, -122, 138, 14, 217, -133, 108, 13, 199, -216,
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91, 3, 149, 100, -126, -143, 142, -84, -204, -144, -22, 104, -25, -168, -275,
121, 167, 114, -8, -251, -98, -179, -284, 49, 31, 36, -178, -31, 168, -41, 160,
64, 125]
```

[25]:
```
print(w1,w2,w3,w4,w5,w6,w7,w8)
```

```
1.3950000000000922 0.1630000000000326 -0.30599999999997785 0.18300000000000058
-0.07600000000000671 0.14769999999999867 0.10680800000000208 -0.2860000000000421
```