Stochastic Gradient Descent

May 20, 2023

[1]:
```
import numpy as np
import pandas as pd
import sklearn
import tensorflow as tf
import matplotlib.pyplot as plt
```

[2]:
```
df=pd.read_csv('Salary_Data.csv')
df.head(3)
```

[2]:

	YearsExperience	Salary
0	1.1	39343.0
1	1.3	46205.0
2	1.5	37731.0

[3]:
```
n=df.shape[0]
w_initial=[1,1]
n
```

[3]:
```
30
```

[4]:
```
def grad(y,x,a,b):
    df_da=-2*a*(y-(a*x+b))
    df_db=2*(y-(a*x+b))
    return df_da,df_db
```

[5]:
```
def SGD(w_initial,learning_rate):
    epochs=100
    for epoch in range(epochs):
        for i in range(n):
            x=df['YearsExperience'][i]
            y=df['Salary'][i]
            df_da,df_db=grad(y,x,w_initial[0],w_initial[1])
            w_initial[0]=w_initial[0]-learning_rate*df_da
            w_initial[1]=w_initial[1]-learning_rate*df_db
    return w_initial
```

[6]:
```
SGD(w_initial,0.0000001)
```

[6]:
```
[13972.32893872599, -8.626254881312729]
```

[7]:
```
df['YearsExperience'][1]
```

[7]:
```
1.3
```

[8]:
```
df['Salary'][1]
```

[8]:
```
46205.0
```

[9]:
```
w_initial[0]*df['YearsExperience'][1]-w_initial[1]
```

[9]:
```
18172.6538752251
```

[10]:
```
error=df['Salary'][1]-w_initial[0]*df['YearsExperience'][1]-w_initial[1]
```

[11]:
```
error_per=error/df['Salary'][1]*100
```

[11]:
```
60.70684695279197
```