Multivariate Batch GD

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In [1]:

```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
```

In [2]:

```
data = pd.read_csv('C:/Users/91917/Downloads/ex1data2.txt')
data.head()
```

Out[2]:

	2104	3	399900
0	1600	3	329900
1	2400	3	369000
2	1416	2	232000
3	3000	4	539900
4	1985	4	299900

In [3]:

```
data.isnull().sum()
```

Out[3]:

```
2104      0
3         0
399900    0
dtype: int64
```

In [4]:

```
def normalize(dataframe):
    df = dataframe.copy()
    for col in df.columns:
        df[col] = (df[col]-df[col].mean())/df[col].std()
    return df
```

In [5]:

```
normallized_data = normalize(data)
normallized_data.head()
```

Out[5]:

	2104	3	399900
0	-0.495977	-0.226166	-0.073110
1	0.499874	-0.226166	0.236953
2	-0.725023	-1.526618	-0.849457
3	1.246762	1.074287	1.592190
4	-0.016724	1.074287	-0.311010

In [6]:

```
x = normallized_data.iloc[:,:-1].values
```

```
x = normallized_data.iloc[:,:-1].values
y = normallized_data.iloc[:,-1].values
```

In [7]:

```
m = y.size
n = data.shape[1]
```

In [8]:

```
y = y.reshape(m,1)
y.shape
```

Out[8]:

```
(46, 1)
```

In [9]:

```
ones = np.ones((m,1))
x1 = np.concatenate((ones,x),axis=1)
x1[:5]
```

Out[9]:

```
array([[ 1.        , -0.4959771 , -0.22616564],
       [ 1.        ,  0.49987391, -0.22616564],
       [ 1.        , -0.72502283, -1.52661805],
       [ 1.        ,  1.24676217,  1.07428677],
       [ 1.        , -0.0167238 ,  1.07428677]])
```

In [10]:

```
##bwd prg with epochs
alpha=0.01
epoch=10000
i=0
m=y.size
theta=np.random.rand(n,1)
def LGD(x1,y,theta,epoch,alpha,decimals=5):
    past_cost=[]
    past_theta=[theta]
    for i in range(epoch):
        h_theta=np.dot(x1,theta)
        error=h_theta-y
        cost=1/(2*m)*np.dot(error.T,error)
        past_cost.append(cost)
        theta=theta-alpha*1/m*np.dot(x1.T,error)
        past_theta.append(theta)
        if np.equal(np.round(past_theta[i],decimals=decimals),np.round(past_theta[i+1],d
ecimals=decimals)).sum() == n:
            break


    return past_cost,past_theta,i+1
```

In [11]:

```
past_cost,past_theta,epoch_stop = LGD(x1,y,theta,epoch,alpha,decimals=5)
```

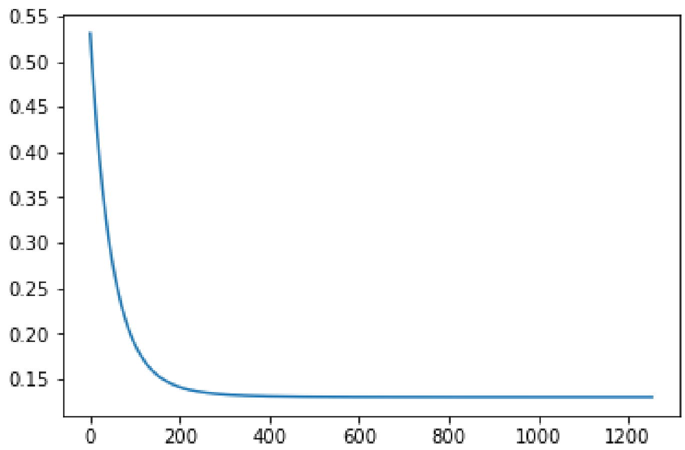
In [12]:

```
print(f'Epoch to stop at {epoch_stop}')
```

```
Epoch to stop at 1255
```

In [19]:

```
e=np.asarray((past_cost))
e=e.reshape((e.size,1))
plt.plot(e)
plt.show()
```



In [20]:

```
past_theta[-1], past_theta[1255]
```

Out[20]:

```
(array([[ 2.68341807e-06],
        [ 8.82760073e-01],
        [-4.87449964e-02]]),
 array([[ 2.68341807e-06],
        [ 8.82760073e-01],
        [-4.87449964e-02]]))
```

In [ ]:

```
```