EX03_Implementation_of_Simple_Linear_Regression_Model_Using_Gradi

April 2, 2023

[22]:
```
import numpy as np
import matplotlib.pyplot as plt
import pandas as pd
```

[23]:
```
data = pd.read_csv("/content/ex1.csv")
data
```

[23]:
```
          a         b
0    6.1101  17.59200
1    5.5277   9.13020
2    8.5186  13.66200
3    7.0032  11.85400
4    5.8598   6.82330
..      …         …
92   5.8707   7.20290
93   5.3054   1.98690
94   8.2934   0.14454
95  13.3940   9.05510
96   5.4369   0.61705

[97 rows x 2 columns]
```

[24]:
```
#compute cost value
def computeCost(X,y,theta):
  m=len(y)
  h=X.dot(theta)
  square_err=(h - y)**2
  return 1/(2*m) * np.sum(square_err)
```

[25]:
```
#computing cost value
data_n=data.values
m=data_n[:,0].size
X=np.append(np.ones((m, 1)),data_n[:,0].reshape(m, 1),axis=1)
y=data_n[:,1].reshape (m,1)
theta=np.zeros((2,1))
computeCost(X,y,theta) # Call the function
```

[25]:

```
32.072733877455676
```

[26]:

```
def gradientDescent (X,y, theta, alpha, num_iters):
  m=len (y)
  J_history=[]

  for i in range(num_iters):
    predictions = X.dot(theta)
    error = np.dot(X.transpose(), (predictions -y))
    descent=alpha * 1/m * error
    theta-=descent
    J_history.append(computeCost (X,y, theta))
  return theta, J_history
```

[27]:

```
#h(x) value
theta,J_history = gradientDescent (X,y, theta, 0.01,1500)
print ("h(x) ="+str (round(theta[0,0],2))+" + "+str(round(theta[1,0],2))+"X1")
```

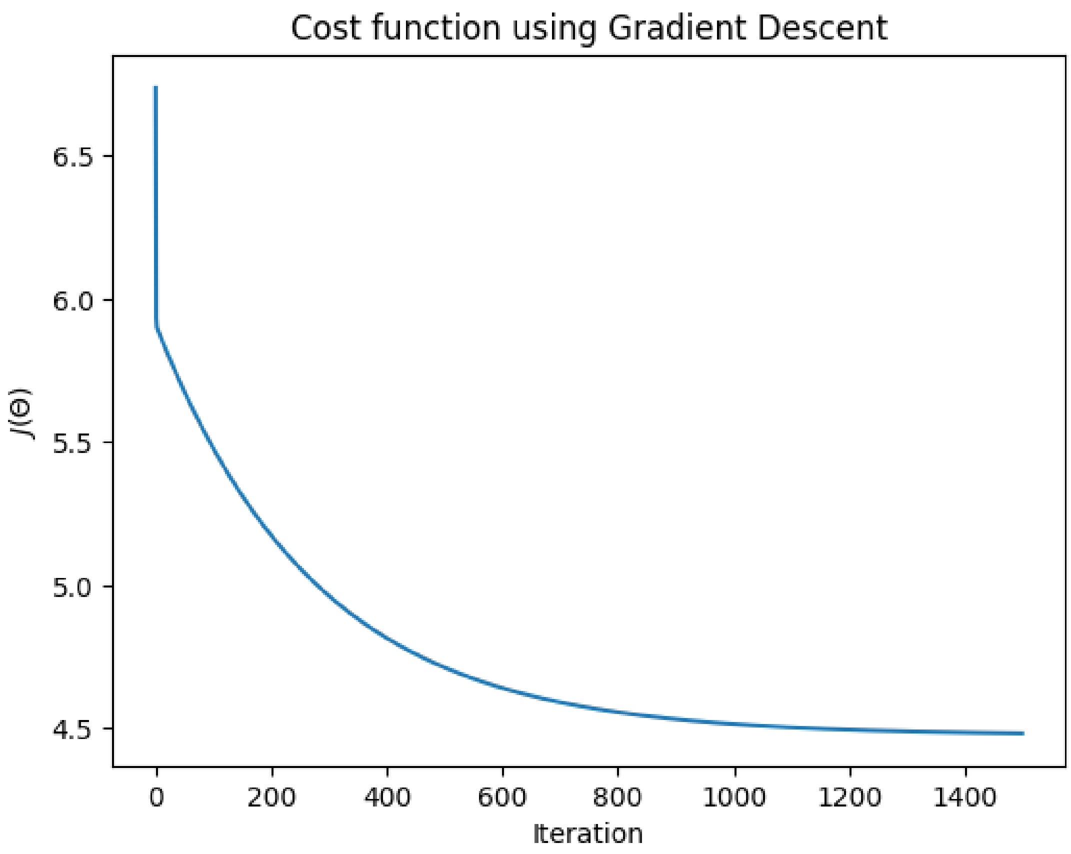
```
h(x) =-3.63 + 1.17X1
```

[28]:

```
plt.plot(J_history)
plt.xlabel("Iteration")
plt.ylabel("$J(\Theta)$")
plt.title("Cost function using Gradient Descent")
```

[28]:

```
Text(0.5, 1.0, 'Cost function using Gradient Descent')
```

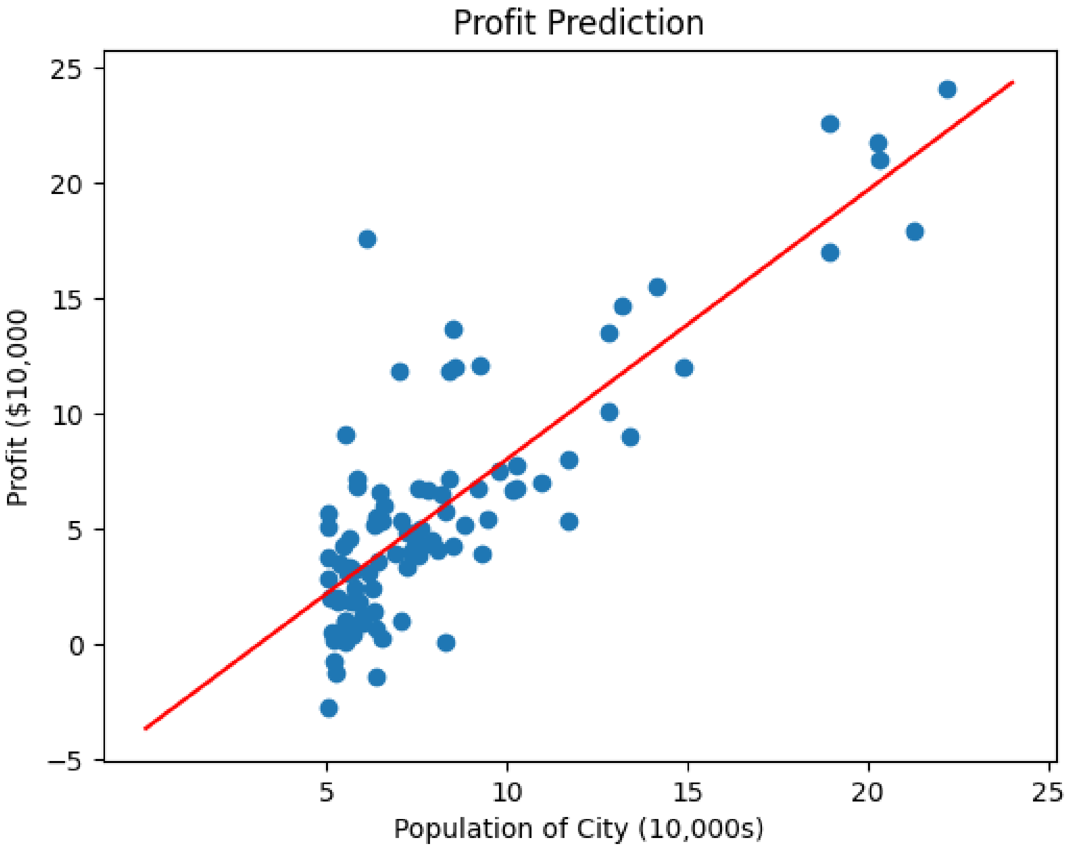


[33]:

```
plt.scatter(data['a'],data['b'])
x_value=[x for x in range (25)]
y_value=[y*theta[1]+theta[0] for y in x_value]
plt.plot(x_value,y_value, color="r")
plt.xticks(np.arange (5,30,step=5))
plt.yticks(np.arange(-5,30,step=5))
plt.xlabel("Population of City (10,000s)")
plt.ylabel("Profit ($10,000")
plt.title("Profit Prediction")
# Text(0.5, 1.0, 'Profit Prediction')
```

[33]:

```
Text(0.5, 1.0, 'Profit Prediction')
```



[34]:

```
def predict (x,theta):
# 11 11 11
# Takes in numpy array of x and theta and return the predicted value of y based␣
  ↪on theta
  predictions= np.dot (theta.transpose (),x)
  return predictions[0]
```

[35]:

```
predict1=predict(np.array([1,3.5]),theta)*10000
print("For population = 35,000, we predict a profit of␣
  ↪$"+str(round(predict1,0)))
```

```
For population = 35,000, we predict a profit of $4520.0
```

[36]:

```
predict2=predict(np.array ([1,7]), theta)*10000
print("For population = 70,000, we predict a profit of␣
  ↪$"+str(round(predict2,0)))
```

```
For population = 70,000, we predict a profit of $45342.0
```