Manual de Usuario

Py1_A01028889

Requisitos

- Archivo `.txt`

  Este archivo debe de contar con los datos en un formato numérico, ya sea flotante o entero. La primera linea se toma como un encabezado. Ejemplo de archivo:

  ```
  X Y
  6.1101 17.592
  5.5277 9.1302
  8.5186 13.662
  ...
  ```

  Por defecto el programa buscara el archivo en:

  ```
    def
  readDataFile(filePath="Homeworks/MathFundamentals/Py1_SimpleLinearRegression
  /ex1data1.txt"):
  ```

  Si tu archivo está en la misma carpeta que tu script `.py`, cámbialo a:

  ```
  def readDataFile(filePath="./ex1data1.txt")
  ```

Funcionamiento

- Lectura de datos:

  Se cargan nuestros vectores `x` y `y` a partir de nuestra función `readDataFile`

- Definición de valores

  Se define el vector de `theta` en `0's`

  Configuramos los hiperparametros:

  - nuestra tasa de aprendizaje: `alpha = 0.01`
  - número de iteraciones: `iterations = 1500`

- Gradiente descendiente

  Por cada iteración se ajusta el valor de `theta` para minimizar nuestra función de costo.

Este guarda el historial del costo en un arreglo `J`

- Gráficación

  Una vez teniendo nuestros datos calculados, se gráfica la línea de regresión sobre los datos originales.

Ejemplo de uso

Archivo txt

```
Poblaci□n  Ganacias
6.1101  17.592
5.5277  9.1302
8.5186  13.662
7.0032  11.854
5.8598  6.8233
8.3829  11.886
7.4764  4.3483
8.5781  12
6.4862  6.5987
5.0546  3.8166
5.7107  3.2522
14.164  15.505
5.734   3.1551
8.4084  7.2258
5.6407  0.71618
5.3794  3.5129
6.3654  5.3048
5.1301  0.56077
6.4296  3.6518
7.0708  5.3893
6.1891  3.1386
20.27   21.767
5.4901  4.263
6.3261  5.1875
5.5649  3.0825
18.945  22.638
12.828  13.501
10.957  7.0467
13.176  14.692
22.203  24.147
5.2524  -1.22
6.5894  5.9966
9.2482  12.134
5.8918  1.8495
8.2111  6.5426
7.9334  4.5623
8.0959  4.1164
5.6063  3.3928
12.836  10.117
6.3534  5.4974
5.4069  0.55657
6.8825  3.9115
```

```
11.708  5.3854
5.7737  2.4406
7.8247  6.7318
7.0931  1.0463
5.0702  5.1337
5.8014  1.844
11.7    8.0043
5.5416  1.0179
7.5402  6.7504
5.3077  1.8396
7.4239  4.2885
7.6031  4.9981
6.3328  1.4233
6.3589  -1.4211
6.2742  2.4756
5.6397  4.6042
9.3102  3.9624
9.4536  5.4141
8.8254  5.1694
5.1793  -0.74279
21.279  17.929
14.908  12.054
18.959  17.054
7.2182  4.8852
8.2951  5.7442
10.236  7.7754
5.4994  1.0173
20.341  20.992
10.136  6.6799
7.3345  4.0259
6.0062  1.2784
7.2259  3.3411
5.0269  -2.6807
6.5479  0.29678
7.5386  3.8845
5.0365  5.7014
10.274  6.7526
5.1077  2.0576
5.7292  0.47953
5.1884  0.20421
6.3557  0.67861
9.7687  7.5435
6.5159  5.3436
8.5172  4.2415
9.1802  6.7981
6.002   0.92695
5.5204  0.152
5.0594  2.8214
5.7077  1.8451
7.6366  4.2959
5.8707  7.2029
5.3054  1.9869
8.2934  0.14454
```

```
13.394  9.0551
5.4369  0.61705
```

Guardado de datos

```
x shape:  (97, 2)
x:  [[ 1.      6.1101]
 [ 1.      5.5277]
 [ 1.      8.5186]
 [ 1.      7.0032]
 [ 1.      5.8598]
 [ 1.      8.3829]
 [ 1.      7.4764]
 [ 1.      8.5781]
 [ 1.      6.4862]
 [ 1.      5.0546]
 [ 1.      5.7107]
 [ 1.     14.164 ]
 [ 1.      5.734 ]
 [ 1.      8.4084]
 [ 1.      5.6407]
 [ 1.      5.3794]
 [ 1.      6.3654]
 [ 1.      5.1301]
 [ 1.      6.4296]
 [ 1.      7.0708]
 [ 1.      6.1891]
 [ 1.     20.27  ]
 [ 1.      5.4901]
 [ 1.      6.3261]
 [ 1.      5.5649]
 [ 1.     18.945 ]
 [ 1.     12.828 ]
 [ 1.     10.957 ]
 [ 1.     13.176 ]
 [ 1.     22.203 ]
 [ 1.      5.2524]
 [ 1.      6.5894]
 [ 1.      9.2482]
 [ 1.      5.8918]
 [ 1.      8.2111]
 [ 1.      7.9334]
 [ 1.      8.0959]
 [ 1.      5.6063]
 [ 1.     12.836 ]
 [ 1.      6.3534]
 [ 1.      5.4069]
 [ 1.      6.8825]
 [ 1.     11.708 ]
 [ 1.      5.7737]
 [ 1.      7.8247]
 [ 1.      7.0931]
```

```
 [ 1.      5.0702]
 [ 1.      5.8014]
 [ 1.     11.7   ]
 [ 1.      5.5416]
 [ 1.      7.5402]
 [ 1.      5.3077]
 [ 1.      7.4239]
 [ 1.      7.6031]
 [ 1.      6.3328]
 [ 1.      6.3589]
 [ 1.      6.2742]
 [ 1.      5.6397]
 [ 1.      9.3102]
 [ 1.      9.4536]
 [ 1.      8.8254]
 [ 1.      5.1793]
 [ 1.     21.279 ]
 [ 1.     14.908 ]
 [ 1.     18.959 ]
 [ 1.      7.2182]
 [ 1.      8.2951]
 [ 1.     10.236 ]
 [ 1.      5.4994]
 [ 1.     20.341 ]
 [ 1.     10.136 ]
 [ 1.      7.3345]
 [ 1.      6.0062]
 [ 1.      7.2259]
 [ 1.      5.0269]
 [ 1.      6.5479]
 [ 1.      7.5386]
 [ 1.      5.0365]
 [ 1.     10.274 ]
 [ 1.      5.1077]
 [ 1.      5.7292]
 [ 1.      5.1884]
 [ 1.      6.3557]
 [ 1.      9.7687]
 [ 1.      6.5159]
 [ 1.      8.5172]
 [ 1.      9.1802]
 [ 1.      6.002 ]
 [ 1.      5.5204]
 [ 1.      5.0594]
 [ 1.      5.7077]
 [ 1.      7.6366]
 [ 1.      5.8707]
 [ 1.      5.3054]
 [ 1.      8.2934]
 [ 1.     13.394 ]
 [ 1.      5.4369]]

y shape:  (97,1)
y:  [17.592    9.1302  13.662   11.854    6.8233  11.886    4.3483  12.
```

```
  6.5987   3.8166   3.2522  15.505    3.1551   7.2258   0.71618  3.5129
  5.3048   0.56077  3.6518   5.3893   3.1386  21.767    4.263    5.1875
  3.0825  22.638   13.501    7.0467  14.692   24.147   -1.22     5.9966
 12.134    1.8495   6.5426   4.5623   4.1164   3.3928  10.117    5.4974
  0.55657  3.9115   5.3854   2.4406   6.7318   1.0463   5.1337   1.844
  8.0043   1.0179   6.7504   1.8396   4.2885   4.9981   1.4233  -1.4211
  2.4756   4.6042   3.9624   5.4141   5.1694  -0.74279 17.929   12.054
 17.054    4.8852   5.7442   7.7754   1.0173  20.992    6.6799   4.0259
  1.2784   3.3411  -2.6807   0.29678  3.8845   5.7014   6.7526   2.0576
  0.47953  0.20421  0.67861  7.5435   5.3436   4.2415   6.7981   0.92695
  0.152    2.8214   1.8451   4.2959   7.2029   1.9869   0.14454  9.0551
  0.61705
```

Inizializar variables

```
# Initialize theta as a vector of zeros
theta = np.zeros(2)
# Set the learning rate and number of iterations
alpha = 0.01
# Set the number of iterations
iterations = 1500
```

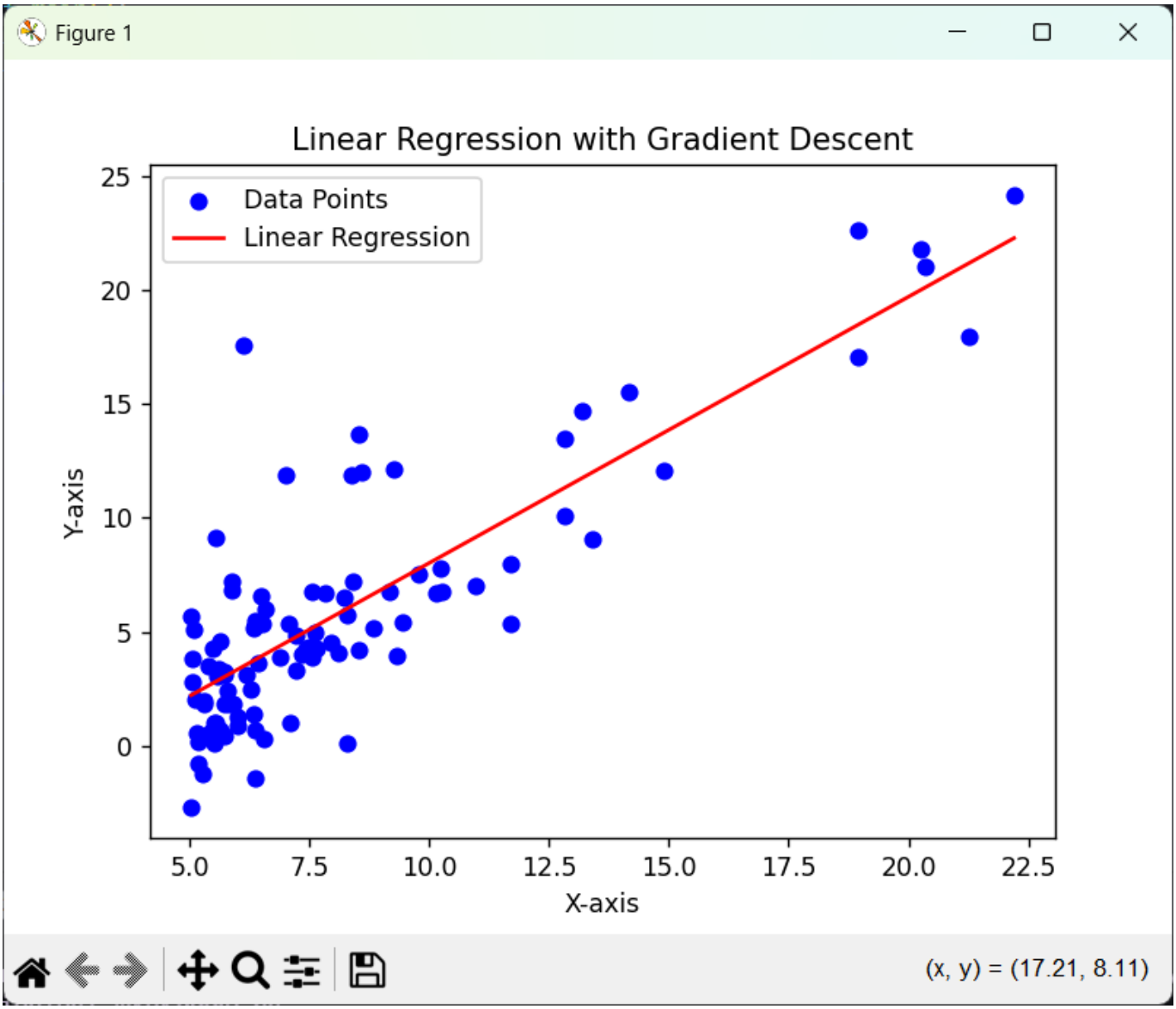
Usar gradiente decendente

```
theta, J =  gradienteDescendente(x, y, theta, alpha, iterations)
```

Esto nos devuelve el valor final de nuestra `theta` y podemos ver nuestro último valor de nuestro costo

```
Final theta:  [-3.63029144  1.16636235]
Final cost J:  4.483388256587726
```

Gràfica de dispersión



Grafica del Error

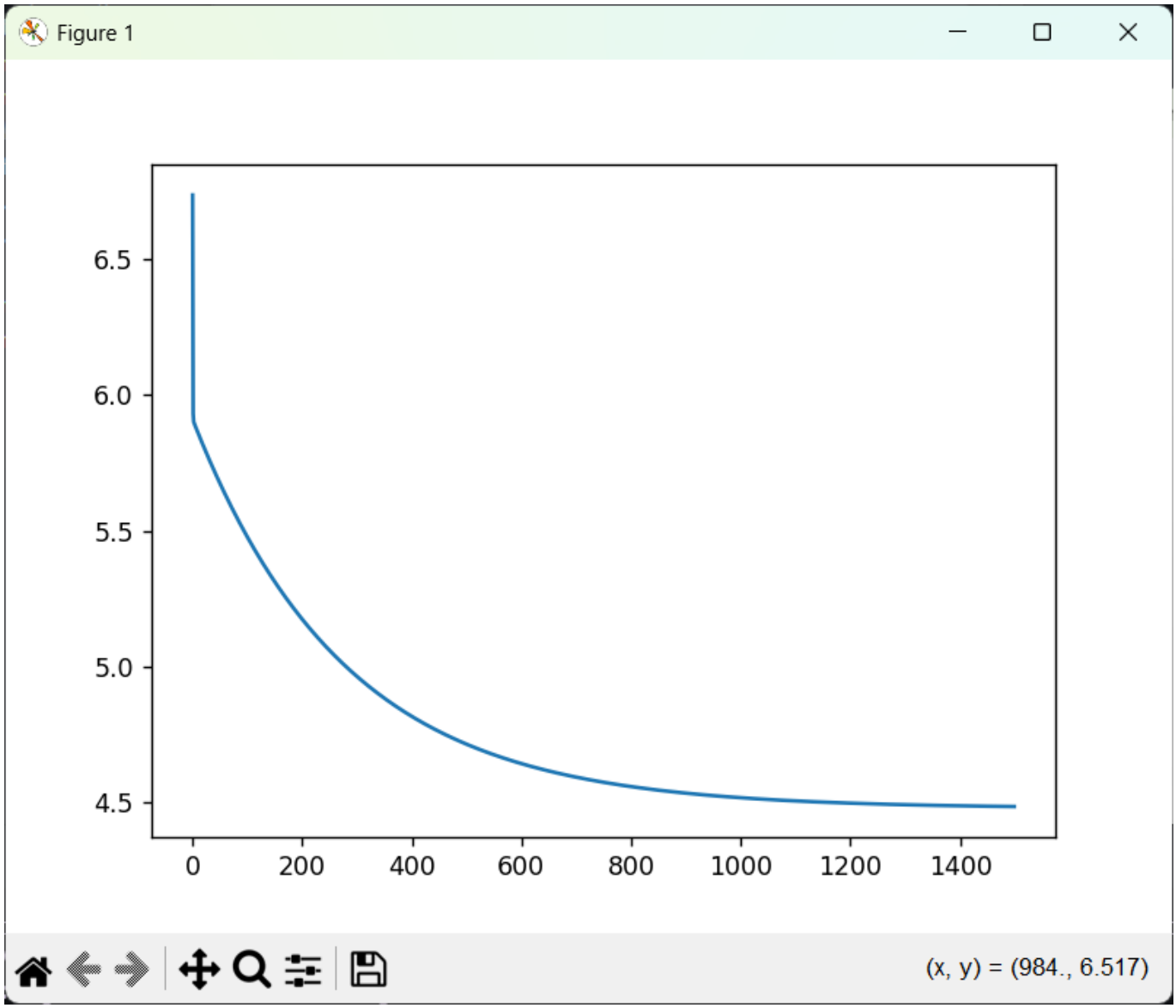


Figure 1
6.5
6.0
5.5
5.0
4.5
0
200
400
600
800
1000
1200
1400
(x, y) = (984., 6.517)