**MULTILINEAR REGRESSION**

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**Attributes:**

X1 : Login Hours

X2 : Break time duration

Y *(Label)* : Productivity

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **X1** | **X2** | **Y** | **X1i-X1bar** | **(X1i-X1bar)^2** | **X2i-X2bar** | **(X2i-X2bar)^2** | **Yi-Ybar** | **(X1i-X1bar)\*(Yi-Ybar)** | **(X2i-X2bar)\*(Yi-Ybar)** |
| **0** | 8.1 | 1.25 | 9.03 | -0.05 | 0.0025 | -0.113333 | 0.012844 | -0.063333 | 0.003167 | 0.007178 |
| **1** | 7.3 | 1.38 | 8.65 | -0.85 | 0.7225 | 0.016667 | 0.000278 | -0.443333 | 0.376833 | -0.007389 |
| **2** | 7.8 | 1.57 | 8.94 | -0.35 | 0.1225 | 0.206667 | 0.042711 | -0.153333 | 0.053667 | -0.031689 |
| **3** | 8.9 | 1.27 | 9.42 | 0.75 | 0.5625 | -0.093333 | 0.008711 | 0.326667 | 0.245000 | -0.030489 |
| **4** | 9.2 | 1.67 | 9.58 | 1.05 | 1.1025 | 0.306667 | 0.094044 | 0.486667 | 0.511000 | 0.149244 |
| **5** | 8.5 | 1.08 | 9.19 | 0.35 | 0.1225 | -0.283333 | 0.080278 | 0.096667 | 0.033833 | -0.027389 |
| **6** | 8.4 | 1.22 | 9.17 | 0.25 | 0.0625 | -0.143333 | 0.020544 | 0.076667 | 0.019167 | -0.010989 |
| **7** | 7.2 | 1.37 | 8.99 | -0.95 | 0.9025 | 0.006667 | 0.000044 | -0.103333 | 0.098167 | -0.000689 |
| **8** | 9.1 | 1.25 | 9.57 | 0.95 | 0.9025 | -0.113333 | 0.012844 | 0.476667 | 0.452833 | -0.054022 |
| **9** | 7.6 | 1.40 | 8.80 | -0.55 | 0.3025 | 0.036667 | 0.001344 | -0.293333 | 0.161333 | -0.010756 |
| **10** | 7.8 | 1.27 | 8.88 | -0.35 | 0.1225 | -0.093333 | 0.008711 | -0.213333 | 0.074667 | 0.019911 |
| **11** | 7.9 | 1.63 | 8.90 | -0.25 | 0.0625 | 0.266667 | 0.071111 | -0.193333 | 0.048333 | -0.051556 |

Calculating means:

X1bar = 8.149999999999999

X2bar = 1.3633333333333333

Ybar = 9.093333333333332

Calculating summations:

summation((X1i-X1bar)\*(Yi-Ybar)) = 2.0779999999999985

summation((X1i-X1bar)^2) = 4.989999999999998

summation(((X2i-X2bar)\*(Yi-Ybar)) = -0.04863333333333311

summation((X2i-X2bar)^2) = 0.35346666666666654

Calculating w1, w2 and w0:

w1 = ((X1i-X1bar)\*(Yi-Ybar)) / summation((X1i-X1bar)^2)

= 0.41643286573146276

w2 = -0.13758958883440153

w0 = Ybar - X1bar \* w1 - X2bar \* w2

= 5.886985950399478

Now,

**y = w0 + w1 \* x1 + w2 \* x2**

**Predicting values for given inputs**

Calcutating y\_pred for x1 = 9.5 and x2 = 1.67:

x1 = 9.5

x2 = 1.67

Y\_pred = w0 + w1\*x1 + w2\*x2

= 9.613323561494925

Calcutating y\_pred for x1 = 7 and x2 = 1.15:

x1 = 7

x2 = 1.15

Y\_pred = w0 + w1\*x1 + w2\*x2

= 9.642473862096127