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0.

The thetas are 0 if our test data is 1,1 2,2 3,3 4,4 etc even for increasing degrees.

The result are

Predicted test score for 20 hours studied: 19.999999999999996
Goodness of fit (r2 score): 1.0

1.

The goodness of fit increases as you increase your degrees. This means that the higher the degree the more accurate our model is for our data sample.

This does not mean that our model will be great for all population though due to our small sample size.

Degree 1 results:

Theta1 and Theta0 [2.01467487 -3.9057602]
Predicted test score for 20 hours studied: 36.38773723347843
Goodness of fit (r2 score): 0.8777480188408424

Degree 2 results:

Thetas . . . [-0.01058553 2.58803242 -9.52024218]
Predicted test score for 20 hours studied: 38.00619409123072
Goodness of fit (r2 score): 0.8817956886030568

Degree 3 results:

Thetas . . . [8.52013763e-04 -7.98813379e-02 4.15135956e+00 -1.78621296e+01]
Predicted test score for 20 hours studied: 40.02863655926521
Goodness of fit (r2 score): 0.8867312025237684

Degree 4 results:

Thetas . . . [1.14947762e-04 -1.11893755e-02 3.28381081e-01 -7.42548269e-01 -
2.97572062e+00]
Predicted test score for 20 hours studied: 42.402384403856445
Goodness of fit (r2 score): 0.9030912305839351

2.

The best fit slowly increases depending on the degrees, so for our client we would want a regression model with a high degree.

Next steps with only these two features would be fine tuning the degrees to be the most accurate and worth it with performance. We would want to test it with more sample sizes or even see if there is a better model for our problem.

Degree 2 Results:

Thetas . . . [3.70309274e-02 -2.92624640e+01 2.89428054e+05]
Goodness of fit (r2 score): 0.8238032384900786

Degree 3 Results:

Thetas . . . [1.60625300e-05 -7.80766312e-02 2.21824187e+02 1.25859062e+05]
Goodness of fit (r2 score): 0.8308733966540526

Degree 4 Results:

Thetas . . . [2.37472858e-08 -2.10291417e-04 6.76172691e-01 -8.11551159e+02

6.14040636e+05]

Goodness of fit (r2 score): 0.8420947226784697

Degree 5 Results:

Thetas . . . [2.78684102e-12 -9.31938603e-09 -6.18145503e-05 3.62854966e-01 -
5.02907568e+02 5.00960790e+05]

Goodness of fit (r2 score): 0.8422143595443214