



Print Module 5 Discussion Post

MAT-243-J3996 Applied Statistics for STEM 23EW3 Module Discussions 5-3 Discussion: Simple Linear Regression



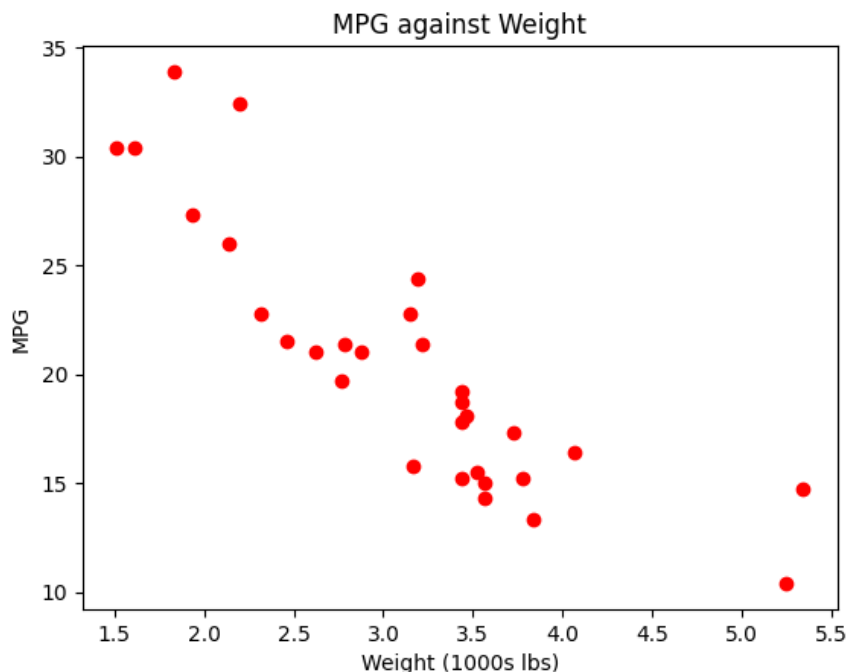
Module 5 Discussion Post

Created by Traver Yates on Feb 1, 2023 3:19 PM ★ Subscribed

The scatterplot shows a negative trend; whereas the weight of the car increases, the miles per gallon decrease. This trend is expected because heavier cars generally have lower fuel efficiency. The correlation coefficient between miles per gallon and weight is -0.861287 , which is a strong negative correlation. The sign of the correlation coefficient is negative, indicating that as the weight of the car increases, the miles per gallon decreases. The simple linear regression equation for miles per gallon as the response variable and weight as the predictor variable is $\text{mpg} = 37.989 - 5.619 * \text{weight}$. The car rental company can use this model to predict the miles per gallon of a car, given its weight. The slope coefficient is -5.619 , which indicates that for every one-unit increase in weight, the miles per gallon decrease by 5.619 units. The P-value for weight in the Python output is 0, meaning that the coefficient is significant at a 5% significance level ($\alpha=0.05$).

Cars data frame (showing only the first five observations)

	Unnamed: 0	mpg	cyl	displacement	horsepower	drat	wt	qsec	vs	am	gear	carb
10	Merc 280C	17.8	6	167.6	123	3.92	3.440	18.90	1	0	4	4
14	Cadillac Fleetwood	10.4	8	472.0	205	2.93	5.250	17.98	0	0	3	4
12	Merc 450SL	17.3	8	275.8	180	3.07	3.730	17.60	0	0	3	3
11	Merc 450SE	16.4	8	275.8	180	3.07	4.070	17.40	0	0	3	3
1	Mazda RX4 Wag	21.0	6	160.0	110	3.90	2.875	17.02	0	1	4	4



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mpg      wt
mpg  1.000000 -0.861287
wt   -0.861287  1.000000

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OLS Regression Results

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Dep. Variable:          mpg      R-squared:                0.742
Model:                  OLS      Adj. R-squared:            0.733
Method:                 Least Squares      F-statistic:          80.45
Date:                   Wed, 01 Feb 2023    Prob (F-statistic):    1.00e-09
Time:                   13:13:40    Log-Likelihood:       -75.264
No. Observations:       30      AIC:                  154.5
Df Residuals:           28      BIC:                  157.3
Df Model:                1
Covariance Type:        nonrobust
=====
               coef      std err          t      P>|t|      [0.025      0.975]
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Intercept    37.9890      2.035     18.665     0.000     33.820     42.158
wt           -5.6186      0.626     -8.969     0.000     -6.902     -4.335
=====
Omnibus:                 4.395    Durbin-Watson:           1.878
Prob(Omnibus):            0.111    Jarque-Bera (JB):        3.458
Skew:                     0.831    Prob(JB):                 0.177
Kurtosis:                 3.050    Cond. No.                 12.8
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Notes:

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

No items found.