Results

Pearson Correlation Analysis

Introduction

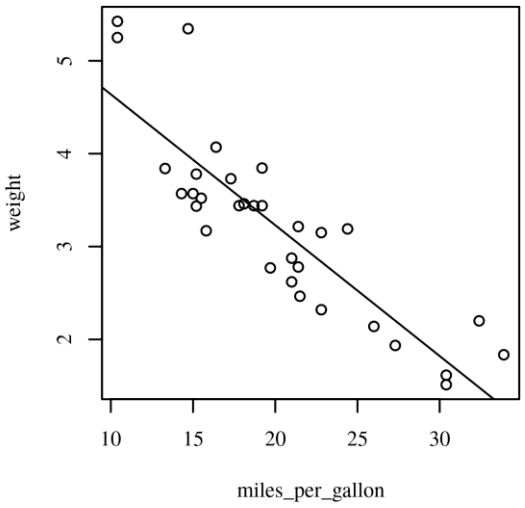
A Pearson correlation analysis was conducted between miles_per_gallon and weight. Cohen's standard was used to evaluate the strength of the relationship, where coefficients between .10 and .29 represent a small effect size, coefficients between .30 and .49 represent a moderate effect size, and coefficients above .50 indicate a large effect size (Cohen, 1988).

Assumptions

Linearity. A Pearson correlation requires that the relationship between each pair of variables is linear (Conover & Iman, 1981). This assumption is violated if there is curvature among the points on the scatterplot between any pair of variables. Figure 1 presents the scatterplot of the correlation. A regression line has been added to assist the interpretation.

Figure 1

Scatterplots with the regression line added for miles_per_gallon and weight



Results

The result of the correlation was examined based on an alpha value of .05. A significant negative correlation was observed between miles_per_gallon and weight, with a correlation of -.87, indicating a large effect size ($p < .001$, 95.00% CI = [-.93, -.74]). This suggests that as miles_per_gallon increases, weight tends to decrease. Table 1 and Table 2 presents the results of the correlation.

Table 1

Pearson Correlation Matrix Between miles_per_gallon and weight

Variable	1	2
1. miles_per_gallon	-	
2. weight	-.87*	-

Note. * *p*

Table 2

Pearson Correlation Results Between miles_per_gallon and weight

Combination	*r*	95.00% CI	*n*	*p*
miles_per_gallon-weight	-.87	[-.93, -.74]	32	< .001

References

Cohen, J. (1988). *Statistical power analysis for the behavior sciences* (2nd ed.). West Publishing Company.

Conover, W. J., & Iman, R. L. (1981). Rank transformations as a bridge between parametric and nonparametric statistics. *The American Statistician, 35*(3), 124-129. https://doi.org/10.1080/00031305.1981.10479327

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Glossaries

Pearson (Product-Moment) Correlation

A correlation expresses the strength of linkage or co-occurrence between two variables in a single value between -1 and +1. This value that measures the strength of linkage is called *correlation coefficient*, which is represented typically as the letter r. The correlation coefficient between two continuous-level variables is also called Pearson's r or Pearson product-moment correlation coefficient. A positive r value expresses a positive relationship between the two variables (the larger A becomes, the larger B becomes) while a negative r value indicates a negative relationship (the larger A becomes, the smaller B becomes). A correlation coefficient of zero indicates no relationship between the variables. However, correlations are limited to linear relationships between variables. Even if the correlation coefficient is zero, a non-linear relationship might exist.

Fun Fact! *Correlation is a widely used term in statistics. In fact, it entered the English language in 1561, 200 years before most of the modern statistic tests were discovered. It is derived from the [same] Latin word correlation, which means relation.*

Bonferroni Correction: If one conducts a lot of correlations, some relationships will occur by chance. To mitigate this, Bonferroni correction is applied. It reduces the alpha level for the analysis, thus reducing the likelihood of making a Type I error (false positive); it is based on the number of times each variable is used.

Correlation Coefficient (*r*): Ranges from -1 to 1; describes to the strength of the relationship between the variables.

Critical Value: The minimum value at which an observed correlation coefficient is statistically significant.

***p*-value:** The probability of obtaining the observed results if the null hypothesis is true. A result is usually considered statistically significant if the *p*-value is $\leq .05$.

Raw Output

Pearson Correlation Test

Included Variables:
miles_per_gallon and weight

Sample Size (Complete Cases):
N = 32

Correlation Matrix:

Variable	1	2
1. miles_per_gallon	-	
2. weight	-0.868*	-

Note. *p

Correlation Results:

Combination	r	95.000% CI	n	p
miles_per_gallon-weight	-0.868	[-0.934, -0.744]	32	1.294×10^{-10}