

Regression Analysis

Simple Linear Regression

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Regression Concepts:
Model Diagnostic Example



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About This Lesson



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Linear Regression: Example in R

A company, which sells medical supplies to hospitals, clinics, and doctors' offices had considered the effectiveness of a new advertising program. Management wants to know if the advertising is related to sales.

This company intends to increase the sales with an effective advertising program.

**Do the assumptions of the linear regression model hold?
What is the explanatory power of the model?**



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Example in R: Residual Analysis

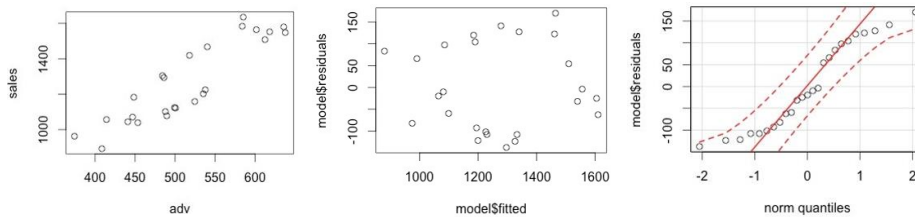
- a. What are the assumptions of linear regression?
- b. Do the assumptions hold? Provide the graphical displays needed to support the diagnostics. Interpret.
- c. Do you identify any outliers?
- d. How much variability in sales is explained by the advertising expenditure?



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Example in R (cont'd)

- a. The assumptions are:
Linearity, Constant Variance, Independence, and Normality.
- b. `plot(adv, sales)`
`plot(model$fitted, model$residuals)`
`library(car); qqPlot(model$residuals)`



Based on the above plots, **the assumptions appear to hold.**

Example in R (cont'd)

- c. *Do you identify any outliers?*

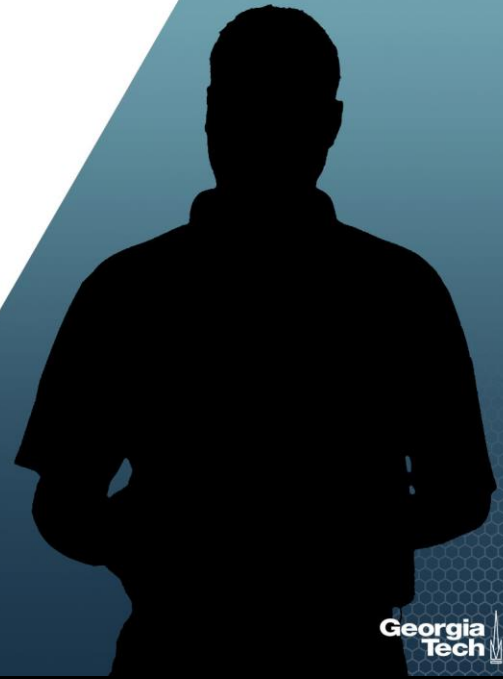
Based on the plots provided in part b, **there do not appear to be outliers.**

- d. *How much variability in sales is explained by the advertisement expenditure?*

```
summary(model)$r.squared
[1] 0.8105919
```

Around **81%** of the variability in sales is explained by the advertising expenditure.

Summary



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