Types of Statistical Inference

Single categorical variable

One-proportion z-interval and test (Chapters 19-21)

Single quantitative variable

One sample t-interval and test (Chapter 23)

Two quantitative variables

Regression inference (Chapter 27)

Two categorical variables

Two categories each:
Two proportion z-interval and test (Chapter 22)

More than two categories each:
Chi-square tests (Chapter 26)

One categorical, one quantitative variable

Two categories:
2-sample t-interval and test (Chapter 24)
Paired t-interval and test (Chapter 25)

More than two categories:
ANOVA test (Chapter 28)

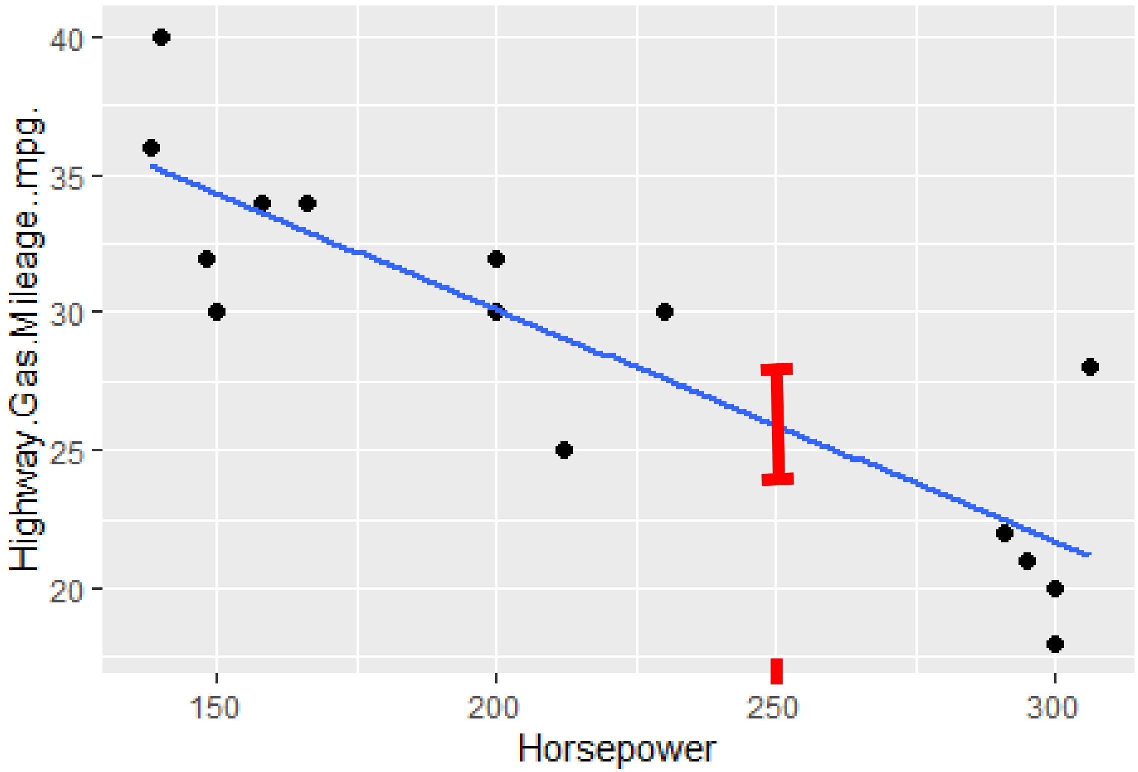
Regression inference

$$\hat{y} = b_0 + b_1 x$$

sample y-intercept   sample slope

$$\mu_y = \beta_0 + \beta_1 x$$

population y-intercept   population slope



Types of regression inference

- **Slope.** Infer the population slope from the sample slope (confidence interval and hypothesis test)
- **Predicted individual value.** Infer the y-value of a case with a given x-value (confidence interval)
- **Predicted mean value.** Infer the average y-value of all cases with a given x-value (confidence interval)

Confidence interval for slope

$$b_1 \pm t^* SE(b_1) \quad \text{or} \quad b_1 \pm t^* \frac{s_e}{s_x\sqrt{n-1}}$$

Hypothesis test for slope

$H_0: \beta_1 = 0.$
$H_A: \beta_1 \neq 0$ or $H_A: \beta_1 < 0$ or $H_A: \beta_1 > 0$. (Pick one.)

$$t = \frac{b_1 - 0}{SE(b_1)} = \frac{b_1 - 0}{\left(\frac{s_e}{s_x\sqrt{n-1}}\right)}$$

both with degrees of freedom $df = n - 2$.

b_1: sample slope

s_e: standard deviation of residuals

s_x: standard deviation of x variable

Confidence interval for predicted mean

$$y \pm t^* \sqrt{\left(\frac{s_e}{s_x\sqrt{n-1}}\right)^2 (x-\bar{x})^2 + \frac{(s_e)^2}{n}}$$

Confidence interval for predicted individual

$$y \pm t^* \sqrt{\left(\frac{s_e}{s_x\sqrt{n-1}}\right)^2 (x-\bar{x})^2 + \frac{(s_e)^2}{n} + (s_e)^2}$$