5.6 Confidence Interval and Sample Size for Discrete Data

MBC 638

Data Analysis and Decision Making

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Confidence Interval for Discrete Data

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Confidence Interval for Discrete Data

For a population proportion (e.g., cosmetic defect):

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Confidence Interval for Discrete Data

For a population proportion (e.g., cosmetic defect):

$$U = p + z * \sqrt{\frac{p(1-p)}{n}}$$
$$L = p - z * \sqrt{\frac{p(1-p)}{n}}$$

Confidence Interval for Discrete Data

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• Upper and lower confidence limits for *p*

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- Where:
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 - \circ n =sample size

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CI Example: Candidate A Voters

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 Of a sample of 300 voters, 164 want to vote for Candidate A.

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CI Example: Candidate A Voters

- Of a sample of 300 voters, 164 want to vote for Candidate A.
- Find the 99% confidence interval for the proportion of voters planning to vote for Candidate A.

$$U \& L = p \pm z * \sqrt{\frac{p(1-p)}{n}}$$

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CI Example: Candidate A Voters (cont.)

$$U \& L = p \pm z * \sqrt{\frac{p(1-p)}{n}}$$

• p = 164/300 = 54.7%

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CI Example: Candidate A Voters (cont.)

$$U \& L = p \pm z * \sqrt{\frac{p(1-p)}{n}}$$
$$= 0.547$$

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CI Example: Candidate A Voters (cont.)

$$U \& L = p \pm z * \sqrt{\frac{p(1-p)}{n}}$$
$$= 0.547 \pm 2.576$$

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CI Example: Candidate A Voters (cont.)

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$$= 0.547 \pm 2.576 \sqrt{\frac{0.547(1-0.547)}{300}}$$
$$= \frac{0.547 \pm 0.077}{10.547 \pm 0.077}$$

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We are 99% confident that the true percentage of voters for Candidate A is between 47.0% and 62.4% (i.e., $0.47 \le \pi \le 0.624$).

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• Where *p* = sample proportion

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