

Estimating a Mean with Confidence Intervals

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Abstract. A short worked example of a Typst document: a t -based confidence interval for a mean, with an equation, table and figure. All numbers are illustrative and use synthetic data.

1 Introduction

Given independent observations $x_1, \dots, x_n$ with sample mean $\bar{x}$ and sample standard deviation s , a $(1 - \alpha)$ confidence interval for the population mean is

$$\bar{x} \pm t_{n-1, 1-\alpha/2} \cdot \frac{s}{\sqrt{n}} \quad (1)$$

Equation 1 assumes the data are approximately normal or n is moderately large.

2 Worked example

Suppose $n = 25$, $\bar{x} = 10.4$ and $s = 2.0$. With $t_{24, 0.975} \approx 2.064$, the half-width is $2.064 \cdot 2.0 / \sqrt{25} \approx 0.83$.

n	Mean	Std. dev.	95% CI
25	10.4	2.0	[9.57, 11.23]

Table 1: Summary statistics and the resulting interval.

Table 1 lists the inputs and the interval.

3 Interval widths

The width shrinks with $\sqrt{n}$, so quadrupling the sample halves it.

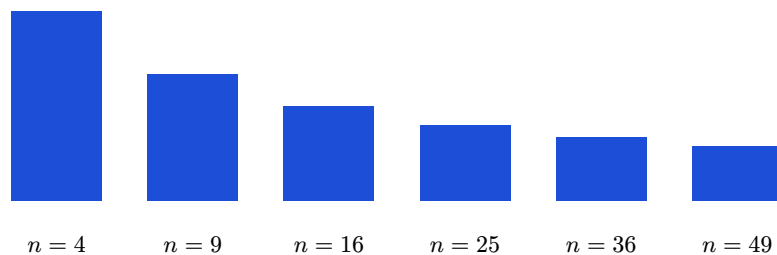


Figure 1: Relative interval width falls as $1/\sqrt{n}$.

4 Limitations

- Synthetic, illustrative numbers only.
- Assumes independent, roughly normal data; heavy tails or dependence need other methods.

5 Reproducing this document

`uv sync`
`uv run typst compile papers/confidence-intervals.typ`