

JMP® Introductory Lab Activities

Activity 9: Confidence Interval for a Mean



Data Set: Big Class.jmp

Summary

The sample mean is sometimes called a *point estimate* because it is only a single value. The true mean of the population is rarely this value. It would be useful to have an interval, rather than a single point, that we could be relatively sure contains the true mean. If we are 95% confident that the interval contains the population mean, we have a *95% confidence interval* for the population mean.

You should have already used the formula for a confidence interval:

$$\text{C.I. for the mean: } \bar{x} \pm (t \text{ critical value}) \left(\frac{s}{\sqrt{n}} \right)$$

In this activity, you will learn how to use JMP to construct a confidence interval for a mean. You will also explore the widths of confidence intervals for different confidence levels and will summarize your findings in a report (required output and discussion is in italics).

The Big Class Data

Open the **Big Class.jmp** data table from the sample data directory. This is the data set containing the heights (in inches) and weights (in pounds) of a random sample of 40 martial arts students.

While we can work with these students as one large sample, there may be differences in the students based on their gender. It might be useful to construct separate confidence intervals for the mean heights of male and female students.

Constructing Confidence Intervals in JMP®

Confidence intervals for the mean are provided in the **Distribution** platform. Go to **Analyze > Distribution**, select **height** as the **Y, Columns** variable and **sex** the **By** variable, and click **OK**.

By default, JMP creates a histogram, a table of quantiles (including the five-number summary) and summary statistics (including the mean and standard deviation) for both females and males. Under the **top red triangle** select **Stack** for a horizontal layout, and select **Uniform Scaling** to apply the same scale to the histograms. These changes make it easier to interpret the graphs and compare distributions and statistics.

Since this class is a random sample of all of the martial arts students of this age range, the sample mean in the Summary Statistics table is a point estimate for the population mean. If we had selected a different sample of students, we would likely have a different point estimate for the population mean. This is due to sampling error.

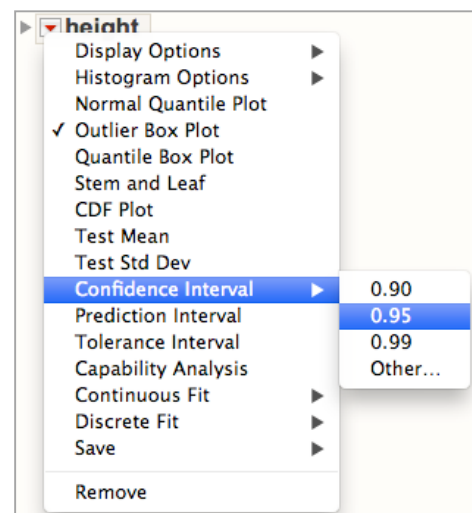
Summary Statistics	
Mean	60.888889
Std Dev	3.6118903
Std Err Mean	0.8513307
Upper 95% Mean	62.68504
Lower 95% Mean	59.092738
N	18

Because of sampling error, to estimate the mean height of the population you would be interested in a confidence interval for the population mean. In the Summary Statistics table, the 95% confidence interval is reported as **Upper 95% Mean** and **Lower 95% Mean**.

Confidence intervals can also be requested from the red triangle next to height – select **Confidence Interval**, then **0.95**.

This produces a new table with the following information:

- Parameter – the mean or standard deviation
- Estimate – the calculated sample statistic
- Lower CI – the lower end of the confidence interval
- Upper CI – the upper end of the confidence interval, and
- 1-Alpha – the confidence level.



Hint: If you hold down the Control key (Command key on the Mac) prior to selecting this command, JMP will produce confidence intervals for both females and males. Holding down the Control key broadcasts commands to other analyses in the same window.

Copy and paste the histogram and summary statistics into a report. Make sure you put a title on your graph.

Exploring Different Confidence Levels

- Click the red triangle next to height and select **Confidence Interval**, then **0.90**.

Copy this new confidence interval table into your report.

- Click the red triangle next to height and select **Confidence Interval**, then **0.99**.

Again, copy this into your report.

Describe how changing the confidence level affects the width of the confidence interval.

Looking at your histogram, what hesitations might you have in using a confidence interval?