INNOVATIVE EDUCATORS

Virtual Summit, 2024-02-29

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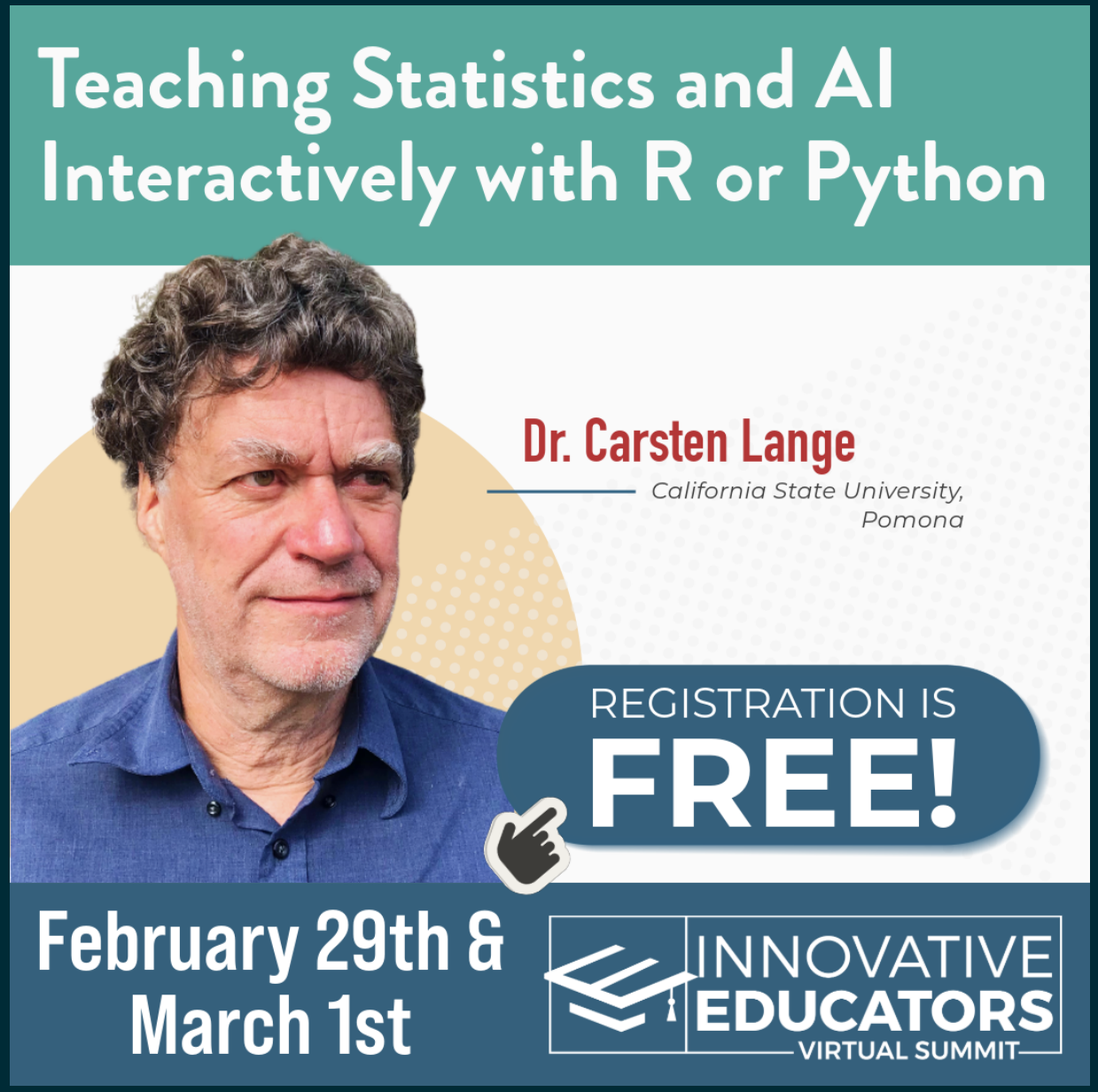

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TOPICS COVERED

1. **R Package TeachHist**
    - Uses ggplot2 R package for histograms
    - In addition to the original horizontal axis, a **Z-score axis** is displayed
    - Displays data, confidence intervals, and hypothesis tests.
2. **Quarto RevealJS Slides**
    - Support R and Python coding
    - Browser-based, but it also supports PDF (and PowerPoint)
    - Supports LaTex equations out of the box
3. **Google Colab**
    - supports interactive R and Python in a browser
    - no software requirements other than an Internet browser
    - supports interactive tutorials
    - requires a Google account for authors and users (viewing works without account)
4. **Quarto for Books/Tutorial**
    - Supports R and Python when writing tutorials or books
    - Generates HTML and PDF simultaneously
    - Supports LaTex
5. **LearnR Package**

START QUARTO

In *RStudio's* main menu:

`File -> New File -> Quarto Presentation -> RevealJS`

Documentation with sample template:

https://quarto.org/docs/presentations/revealjs/

TEACHHIST: HISTOGRAMS FOR TEACHING (PREPARATION)

Data source: 2012 US Army Anthropometric Survey

```
1  library(tidyverse)
2  library(rio)
3  DataFemHeight=import("https://econ.lange-analytics.com/RData/Datasets/DataUSArmyBodyMe
4  select(HeightIn=Heightin)
5  head(DataFemHeight)
```

```
  HeightIn
1       61
2       64
3       68
4       66
5       63
6       67
```

DETERMINING N

```
1  N=nrow(DataFemHeight)
2  cat("Number of female soldiers:", N)
```

```
Number of female soldiers: 1986
```

DETERMINING N WITH PYTHON

```python
DataFemHeightPy=r.DataFemHeight
N=len(DataFemHeightPy["HeightIn"])
print(f"Number of female soldiers: {N}")
```

```
Number of female soldiers: 1986
```

```` {python}
DataFemHeightPy=r.DataFemHeight
len(DataFemHeightPy["HeightIn"])
print(f"Number of female soldiers: {N}")
```
````
````

CALCULATING MEAN

$$\bar{x} = \sum_{i=1}^{N}$$

```
1 mean(DataFemHeight$HeightIn)
```

```
[1] 64.60171
```

CALCULATING STANDARD DEVIATION

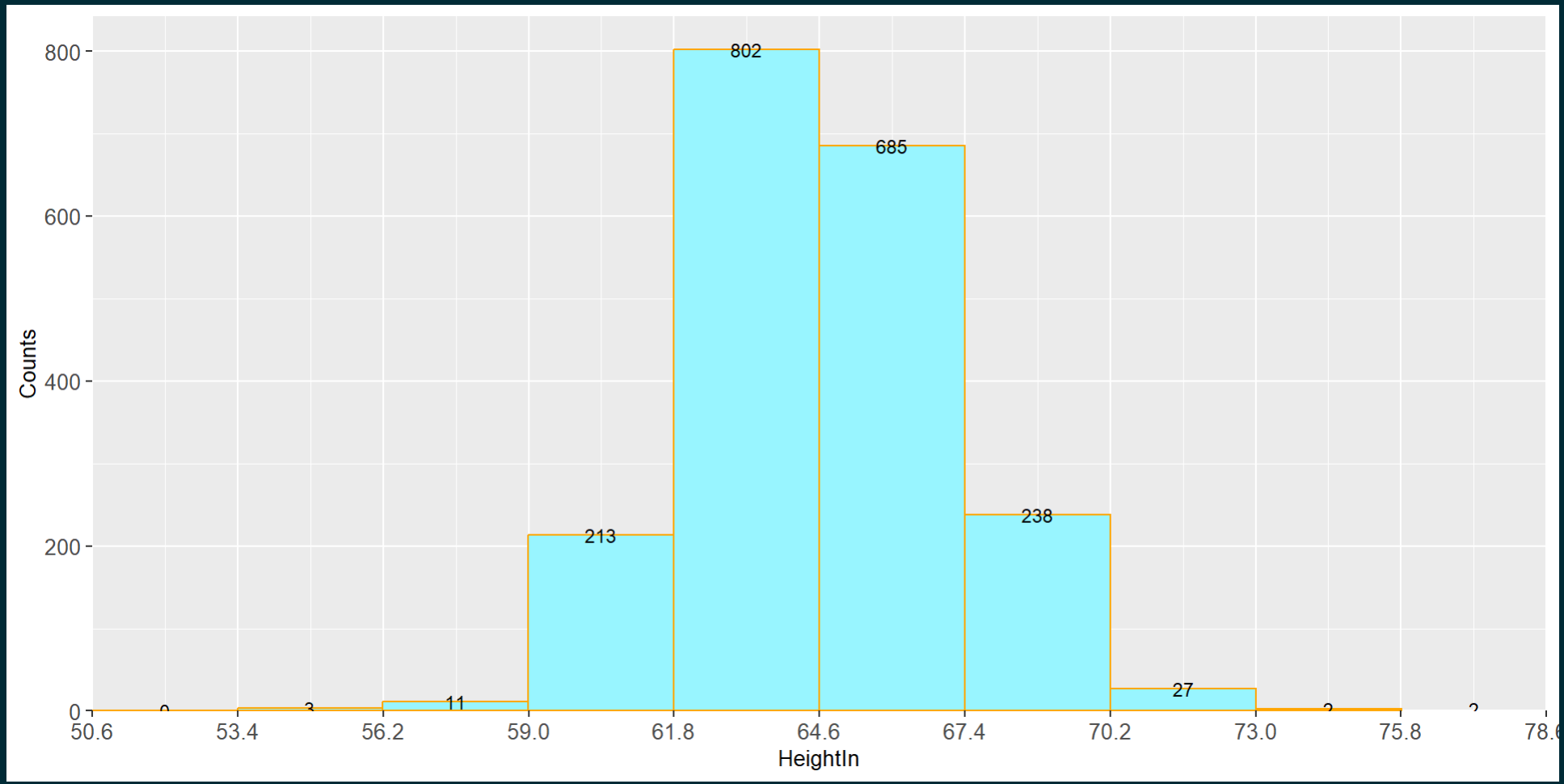
$$SD = \sqrt{\frac{\sum_{i=1}^{N}(x_i - \bar{x})^2}{N-1}}$$

```
1 sd(DataFemHeight$HeightIn)
```

```
[1] 2.801938
```

DISPLAYING DATA WITH TEACHHIST (COUNT DIAGRAM)

```
1  library(TeachHist)
2  TeachHistCounts(PlotData=DataFemHeight,
3                  PrintZAxis = FALSE)
```



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DISPLAYING DATA WITH TEACHHIST (RELFREQ DIAGRAM)

Here goes RelFreq chart

DISPLAYING DATA WITH TEACHHIST (RELFREQ DIAGRAM) – MORE GRANULAR

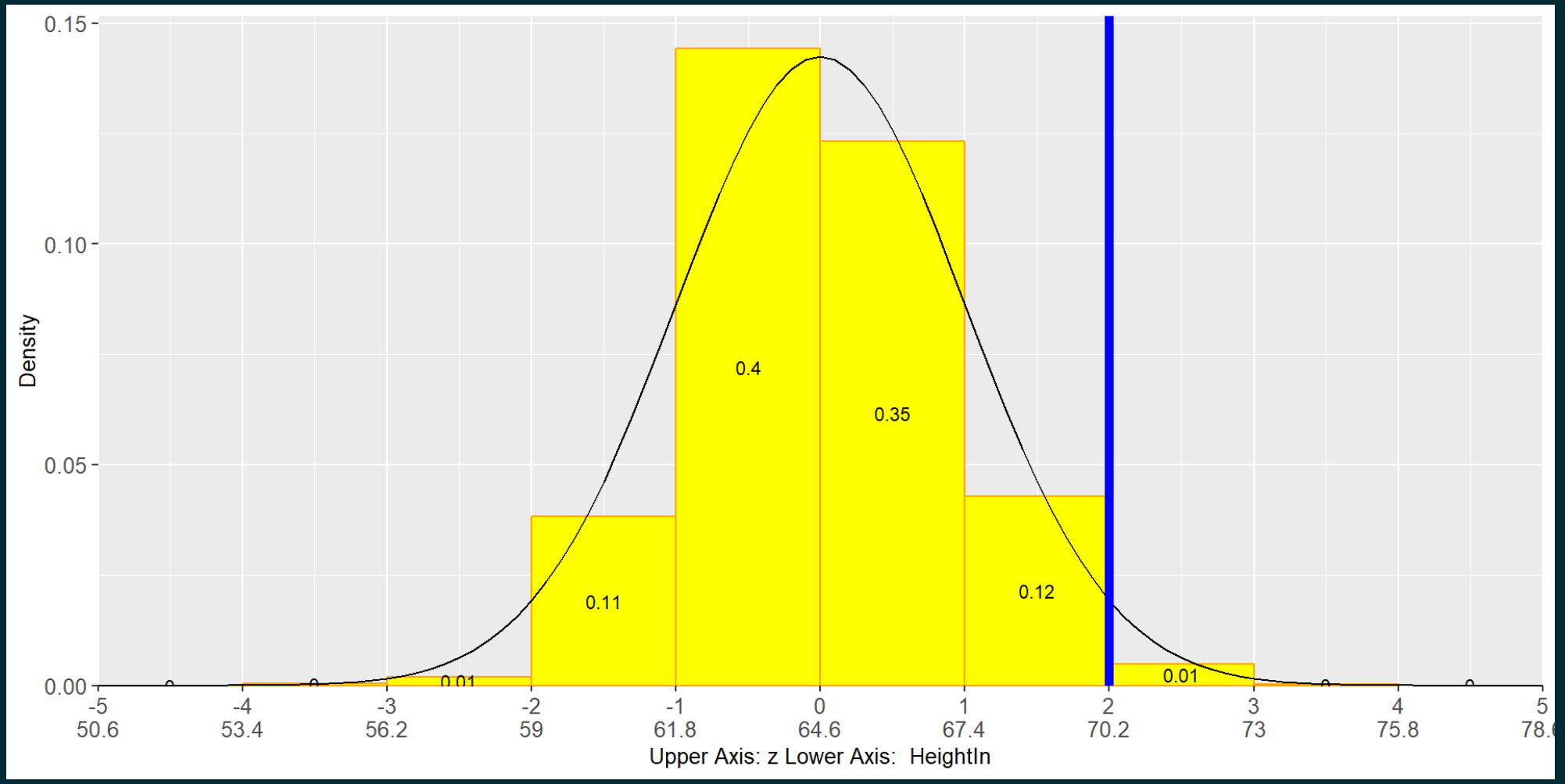
- Click Play-Button to show the code

FROM RELATIVE FREQUENCY TO DENSITY(RELFREQ DIAGRAM)

- So far: the output was generated by *R* but it was not truely interactive
- *Google Colab* allows executing *R* and *Python* code in a browser
- *Google Colab* can be integrated into *Quarto* with a link (opens in new tab; see the footer)
- To execute *Google Colab* a *Google* account is required

SOLUTION FOR THE ASSIGNEMNT

- Click Play-Button to show the code



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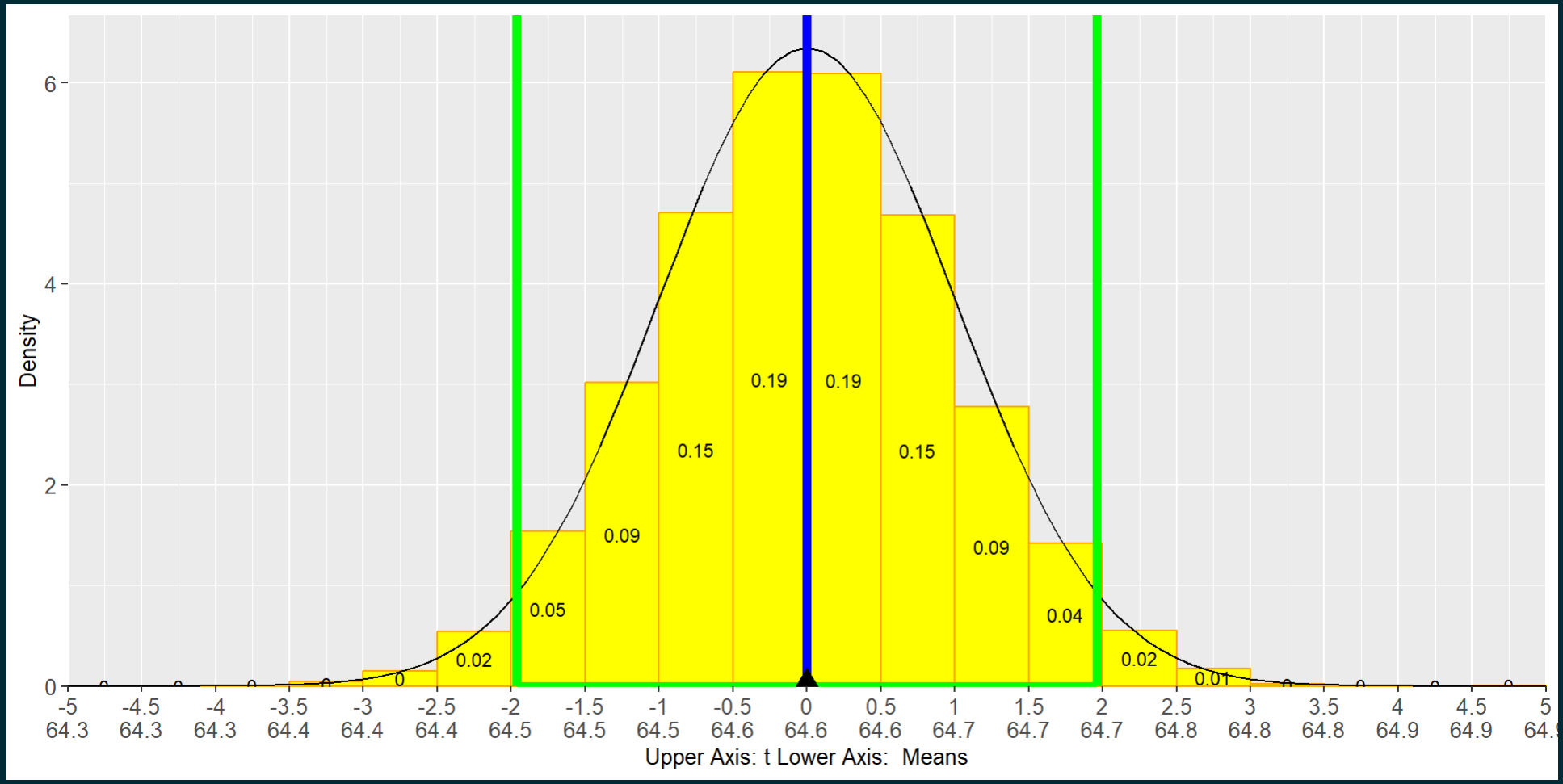
CREATING A BOOK/TUTORIAL WITH QUARTO COMBINED WITH LEARNR

See: Practical Machine Learning with R

CONFIDENCE INTERVALL

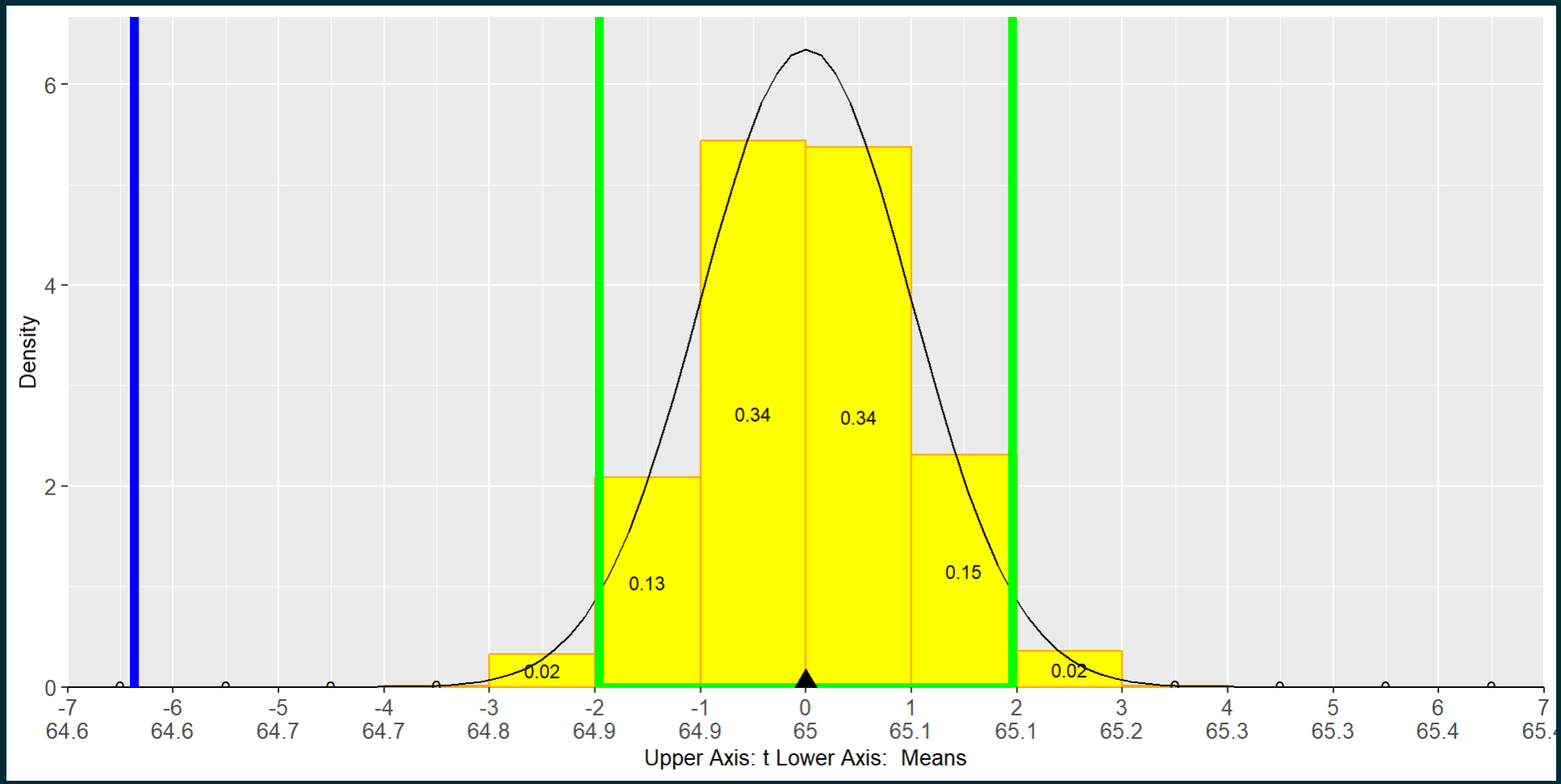
```
1  TeachHistConfInterv(SampleMean=64.6, StandardError=2.8/sqrt(1986),Confidence=0.95, IsS
```



HYPTHESES TEST:

TRUE HEIGHT OF FEMALE SOLDIERS IS 65

```
1  TeachHistHypTest(NullHyp=65, StandardError=2.8/sqrt(1986), SampleMean=64.6, TestType="
```



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THANK YOU!

- **Link to these slides:** https://tinyurl.com/Quarto2024
- **Link to Google Colab demo:** https://tinyurl.com/GoogleColabSample
- **Link to:** R TeachHist package video
- **Link to:** My YouTube channel
- **Link to:** Practical Machine Learning with R (with LearnR examples
  User name: `aibook`
  Pasword: `Coming022024#` (please keep confidential)
- **Link to:** My Blog (going live on 5/1/2024)