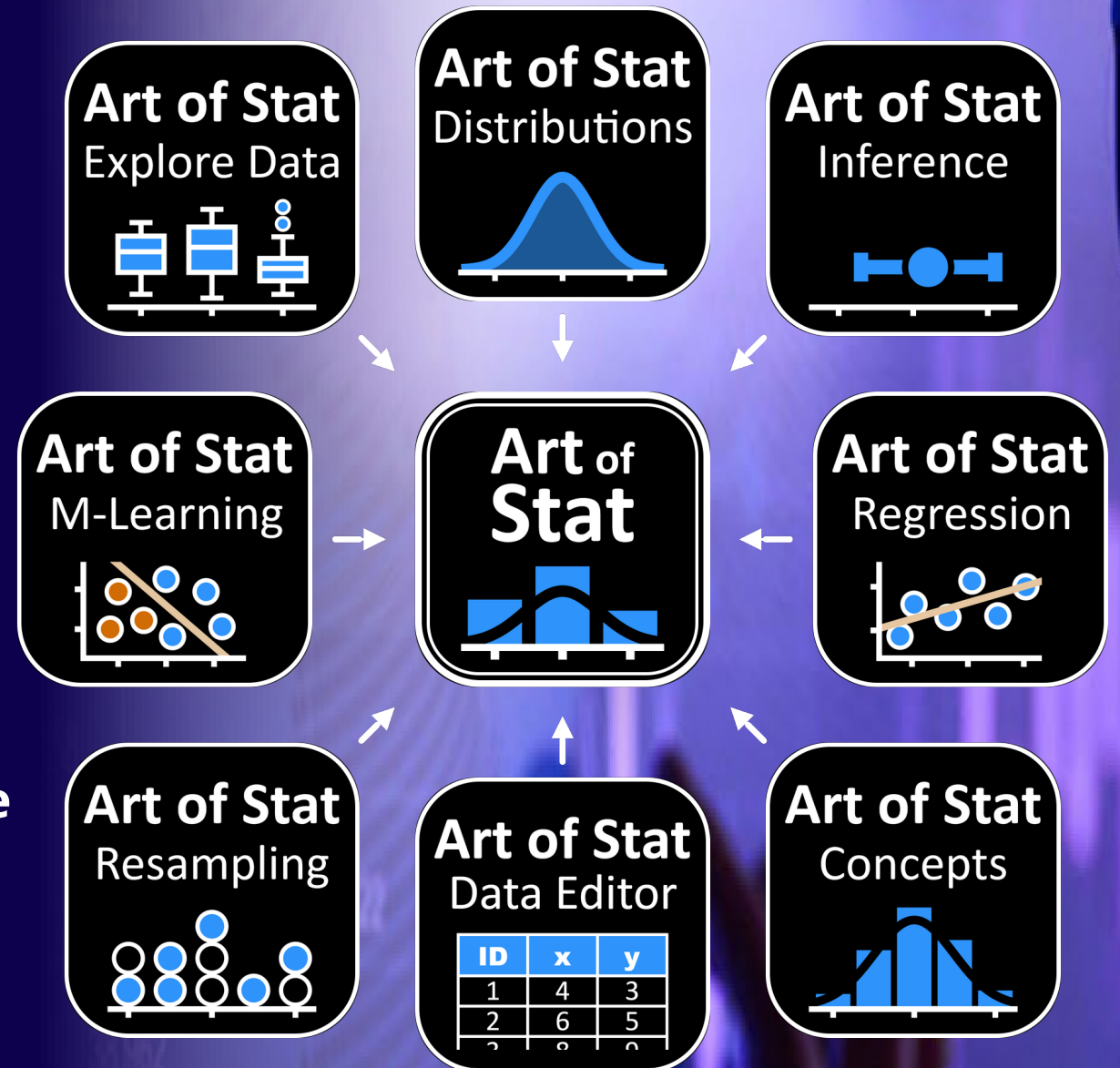


Mobile App for Teaching & Learning Statistics

Bernhard Klingenberg
Director, Masters in Applied Data Science
New College Florida

eCots 2026

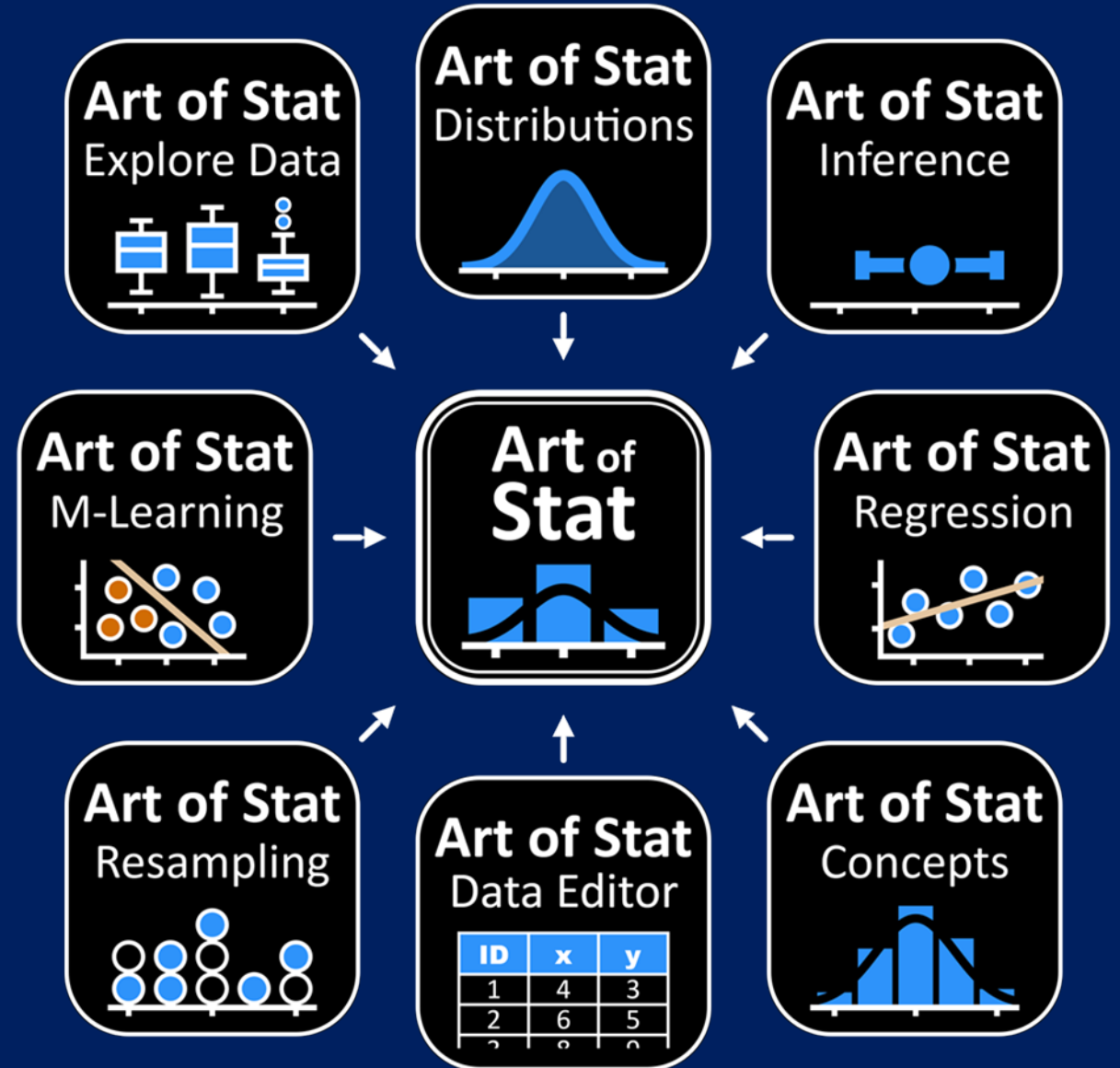
Electronic Conference on Teaching Statistics



The All-in-One Art of Stat Mobile App



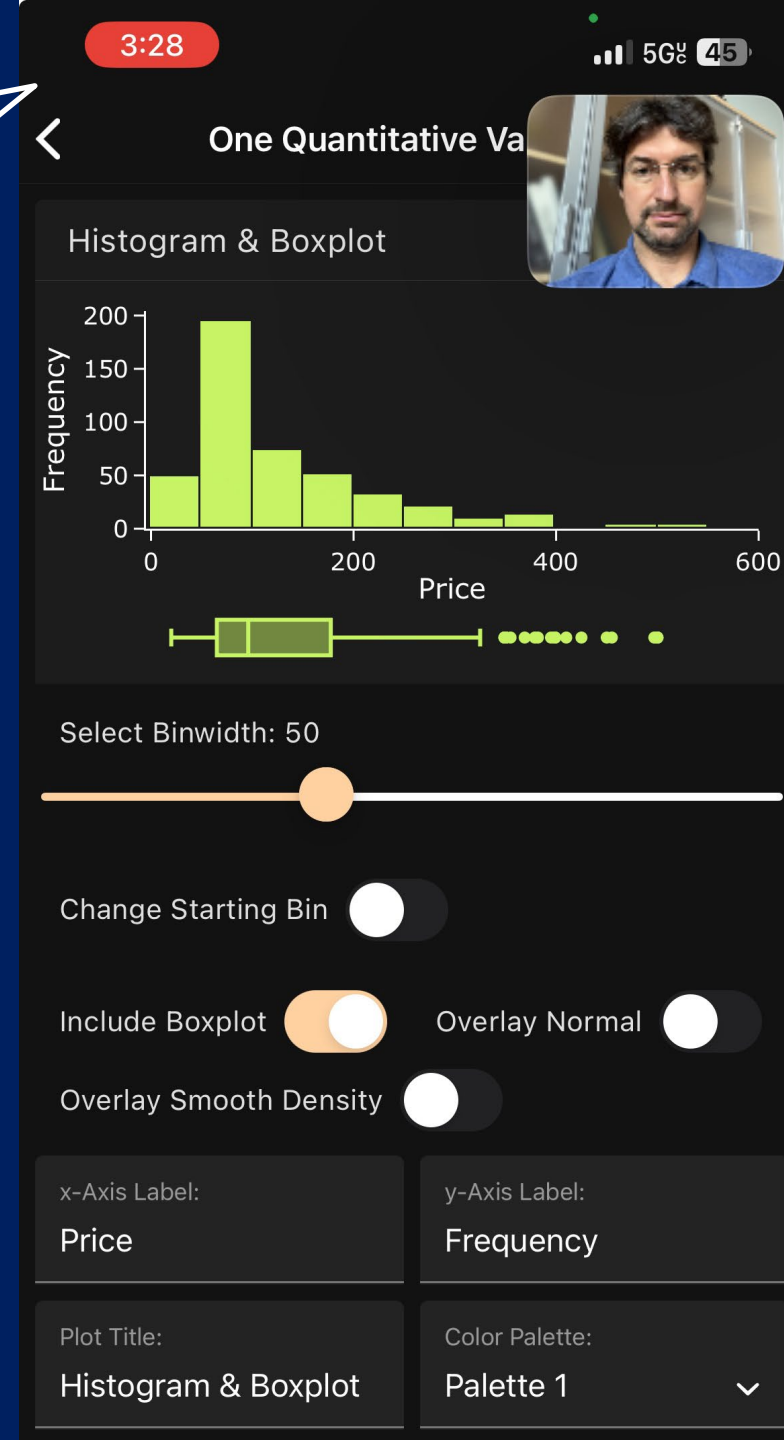
Contains 8 Modules



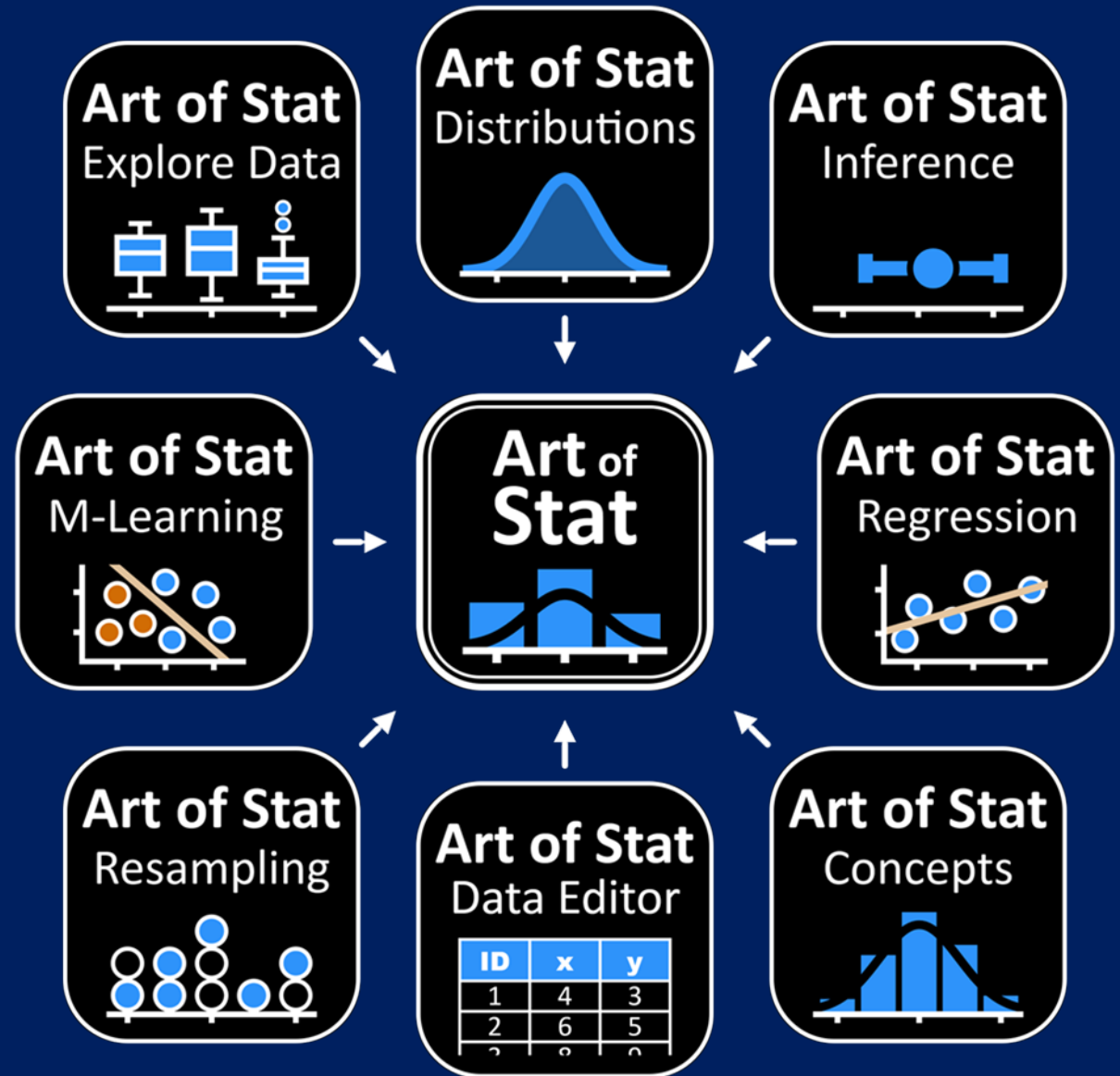
App Technology

Me in a Zoom call
sharing my screen
with the class

- Connect Phone/Tablet to Screen
- Share Screenshots, Join Zoom Calls
- Screen Recording (Videos)
- Upload your own data (.csv, .xls)
- Available 24/7, no lab needed
- Work Off-Line (Airplane Mode)

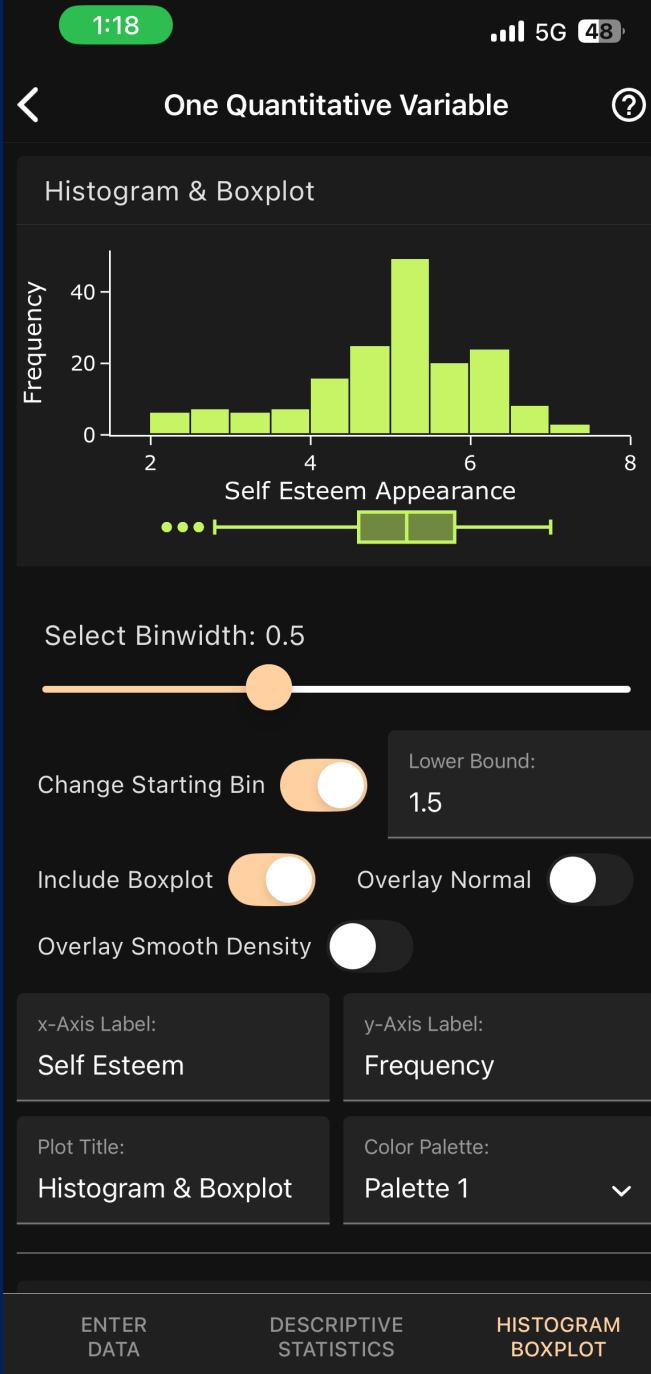
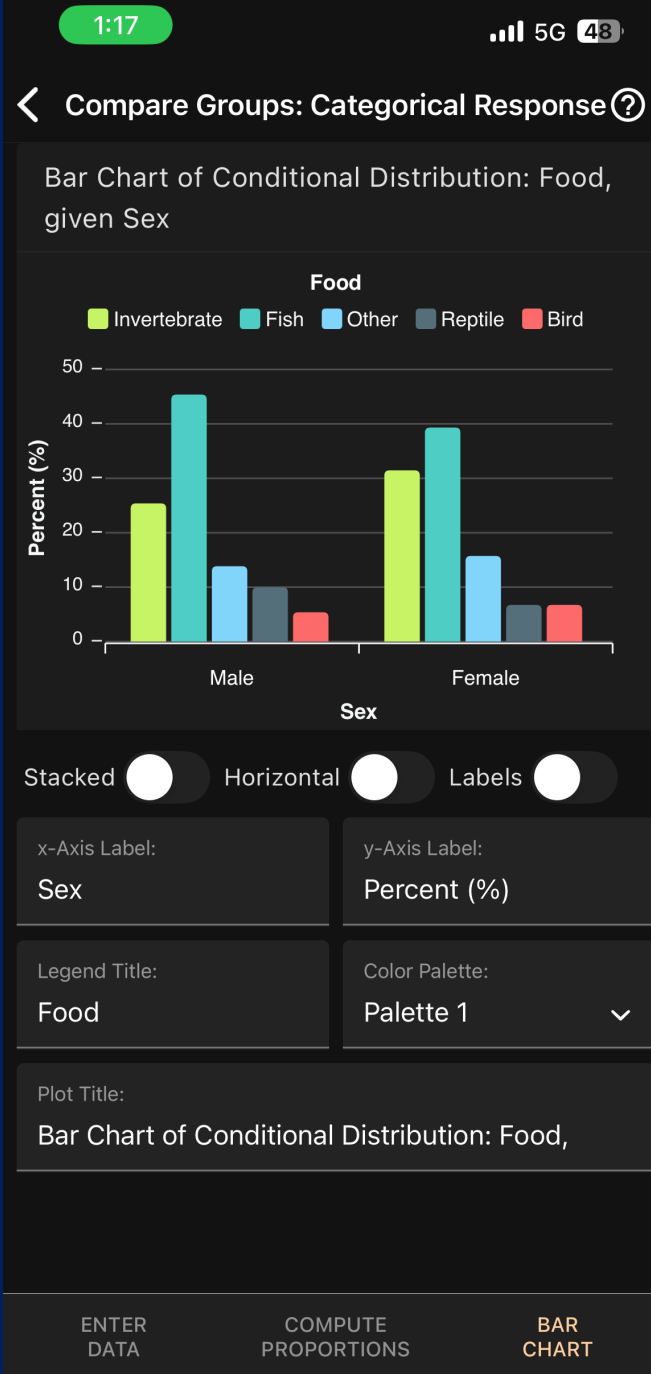
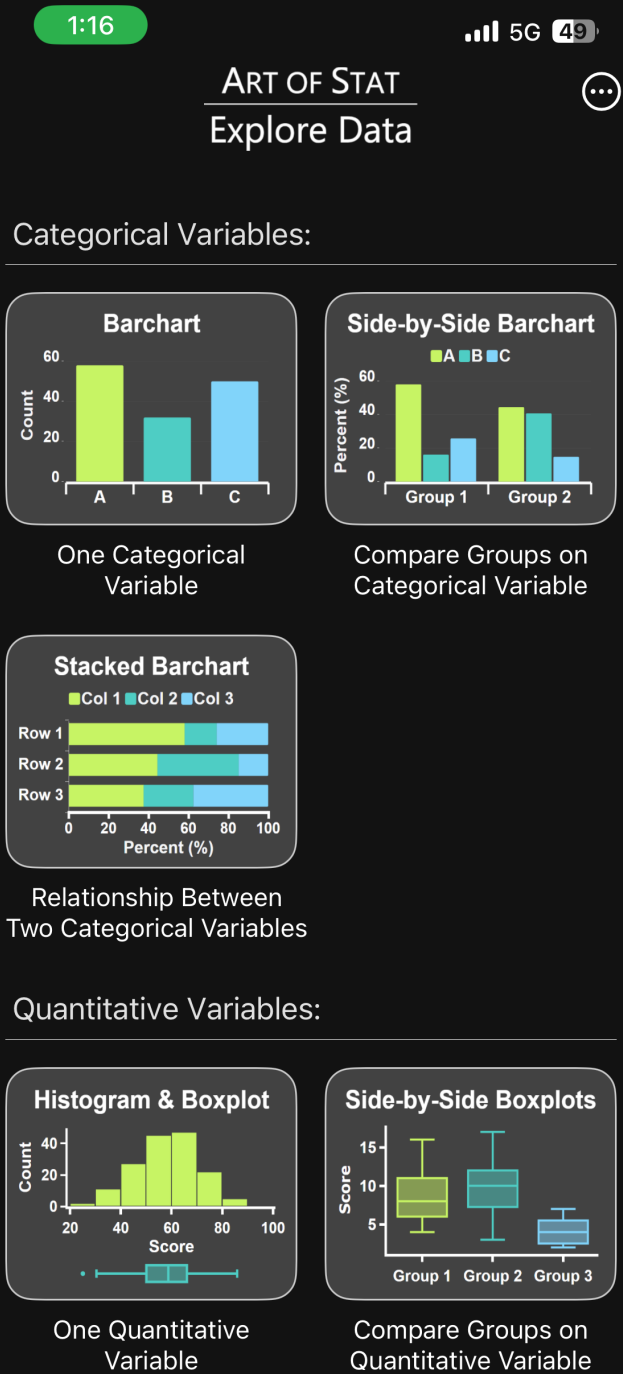


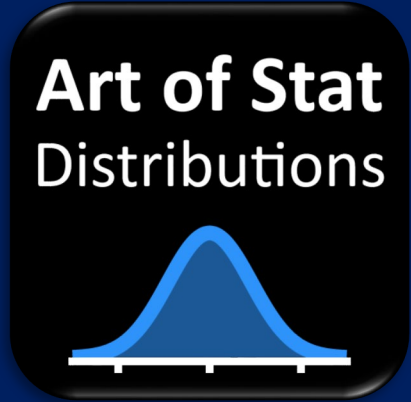
Overview of Modules





Descriptive
Statistics,
Plots
for Categorical
and
Quantitative
Variables,
Scatterplots





Explore & Visualize Discrete and Continuous Probability Distributions

1:27

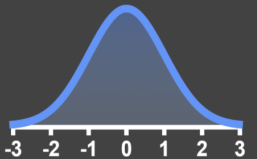
5G 46

ART OF STAT
Distributions

...

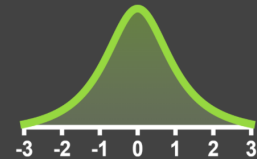
Continuous Distributions:

Normal Distribution



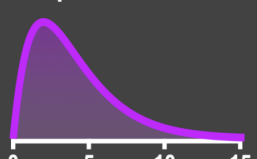
Normal

Student t-Distribution



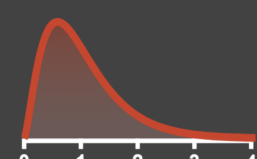
t-Distribution

Chi-Squared Distribution



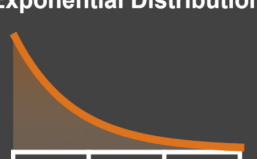
Chi-Squared

F-Distribution



F-Distribution

Exponential Distribution



Exponential

Uniform Distribution



Uniform

Gamma Distribution



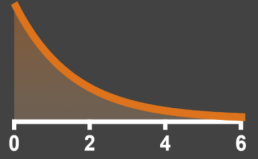
Beta Distribution



1:28

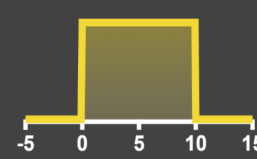
5G 46

Exponential Distribution



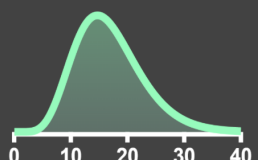
Exponential

Uniform Distribution



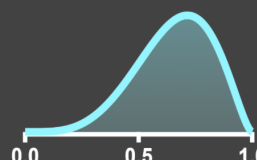
Uniform

Gamma Distribution



Gamma

Beta Distribution



Beta

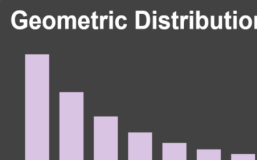
Discrete Distributions:

Binomial Distribution



Binomial

Geometric Distribution



Geometric

Poisson Distribution



Discrete Distribution



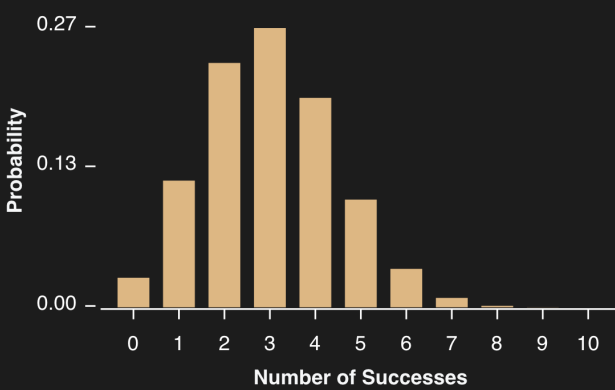
1:28

5G 46

The Binomial Distribution

?

Graph of Distribution: $n = 10, p = 0.3$



Mean: 3, Standard Deviation: 1.449

Number of Bernoulli Trials (n): 10

Probability of Success (p): 0.3

Enter Value for n Enter Value for p

Table of Binomial Probabilities
($n = 10, p = 0.3$)

x	$P(X = x)$	$P(X \leq x)$	$P(X \geq x)$
EXPLORE DISTRIBUTION	FIND PROBABILITY	SIMULATE NUMBERS	



Confidence
Intervals,
Hypothesis
Tests
for one, two &
paired
samples.
Inference for
Linear
Regression

1:36

ART OF STAT

Inference

Inference About Proportions:

Single Population Proportion

95% Confidence Interval

Proportion p

Inference for a Population Proportion (One Sample)

Difference of Two Population Proportions

95% Confidence Interval

Difference p1 - p2

Compare Two Population Proportions (Independent Samples)

McNemar's Test & CI

Compare Two Population Proportions (Dependent Samples)

Chi-Square Test (Goodness of Fit)

Stacked Bar Chart

Chi-Square Test (Goodness of Fit)

Chi-Square Test (Independence/Homogeneity)

Chi-Square Test (Independence or Homogeneity)

1:36

Inference About Means:

Single Population Mean

95% Confidence Interval

Mean μ

Inference for a Population Mean (One Sample)

Difference of Two Population Means

95% Confidence Interval

Difference $\mu_1 - \mu_2$

Compare Two Population Means (Independent Samples)

Paired t-Test & CI

Compare Two Population Means (Dependent Samples)

One-Way ANOVA

One-Way ANOVA

Inference in Linear Regression:

Linear Regression

Regression Line: $\hat{y} = 2.6 + 0.5(x)$

Inference in Linear Regression

1:37

Inference for Two Means

0

Two-Sided

Hypothesis Test for the Difference $\mu_1 - \mu_2$ Between Two Population Means:

Null Hypothesis	$H_0: \mu_1 - \mu_2 = 0$
Alternative Hypothesis	$H_a: \mu_1 - \mu_2 \neq 0$
Difference Between the Two Sample Means ($\bar{x}_1 - \bar{x}_2$)	0.24
Standard Error (se) of the Difference	0.17
Test Statistic (t, df = 136.6)	1.42
P-value	0.1577

μ_1 and μ_2 are population means for groups Male and Female, respectively.

t-Distribution with df = 136.6

Test Statistic: t = 1.42, P-value = 0.1577

ENTER DATA

CONFIDENCE INTERVAL

HYPOTHESIS TEST



Simple Linear, Poisson, Exponential & Logistic Regression.

Multiple Linear & Logistic Regression

2:51

ART OF STAT Regression

Simple Regression (One Predictor)

Linear Regression

$\hat{y} = 5.2 + 0.23(x)$

Longevity

Gestation

Exponential Regression

$\hat{y} = 4.9 * 1.52^{(x)}$

Population

Days

Logistic Regression

$\hat{y} = 1 / (1 + \exp(7.1 - 0.23x))$

P(Card)

Income

Poisson Regression

$\hat{y} = \exp(0.9 + 1.2x)$

Count

x

Multiple Regression (Several Predictors)

Multiple Linear Regression

x_2

y

x_1

x_2

Multiple Linear

Multiple Logistic Regression

Prob

x

Multiple Logistic

2:01

Simple Linear Regression

Scatterplot

Regression Line: $\hat{y} = 5.11 + 0.2286 * x$

Bobcat

Longevity (yrs)

Gestation (days)

Show Linear Regression Line

Show Residuals

Confidence Band for Mean

Prediction Band for New Response

Confidence Level: 95%

Confidence & prediction intervals available on 3rd tab.

Show Smooth Trend Line

x-Axis Label: Gestation (days)

y-Axis Label: Longevity (yrs)

ENTER DATA

SCATTERPLOT AND REGRESSION MODEL

FITTED VALUES AND RESIDUALS

2:03

Multiple Linear Regression

Scatterplot

Species: Adelie Chinstrap Gentoo

Bill Depth (mm)

Bill Length (mm)

Color Points

Regression Line

Fitted Regression Model:

Predicted Bill Depth (mm) = 10.5922 - 1.9332 * I(Species = Chinstrap) - 5.1060 * I(Species = Gentoo) + 0.19989 * Bill Length (mm)

Estimated Regression Parameters:

	Estimate	Standard Error
Intercept	10.5922	0.6830
Species (Chinstrap)	-1.9332	0.2242

ENTER DATA

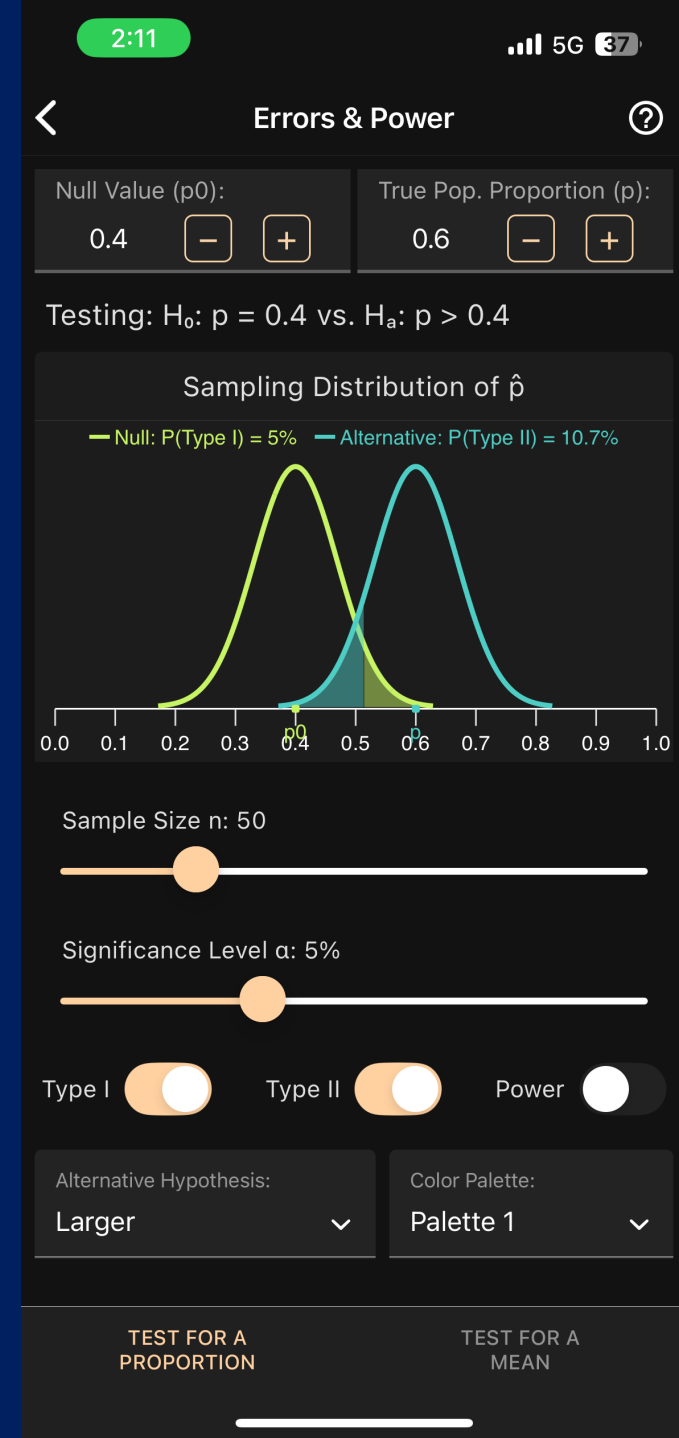
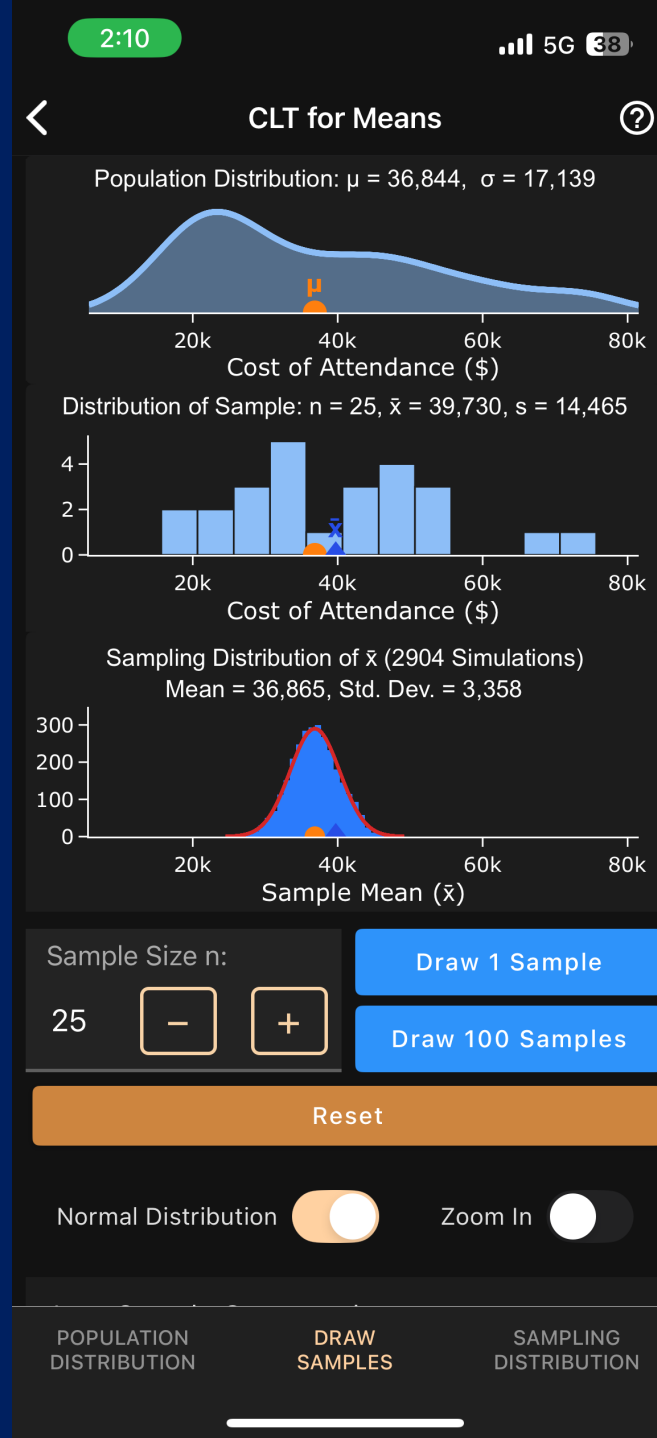
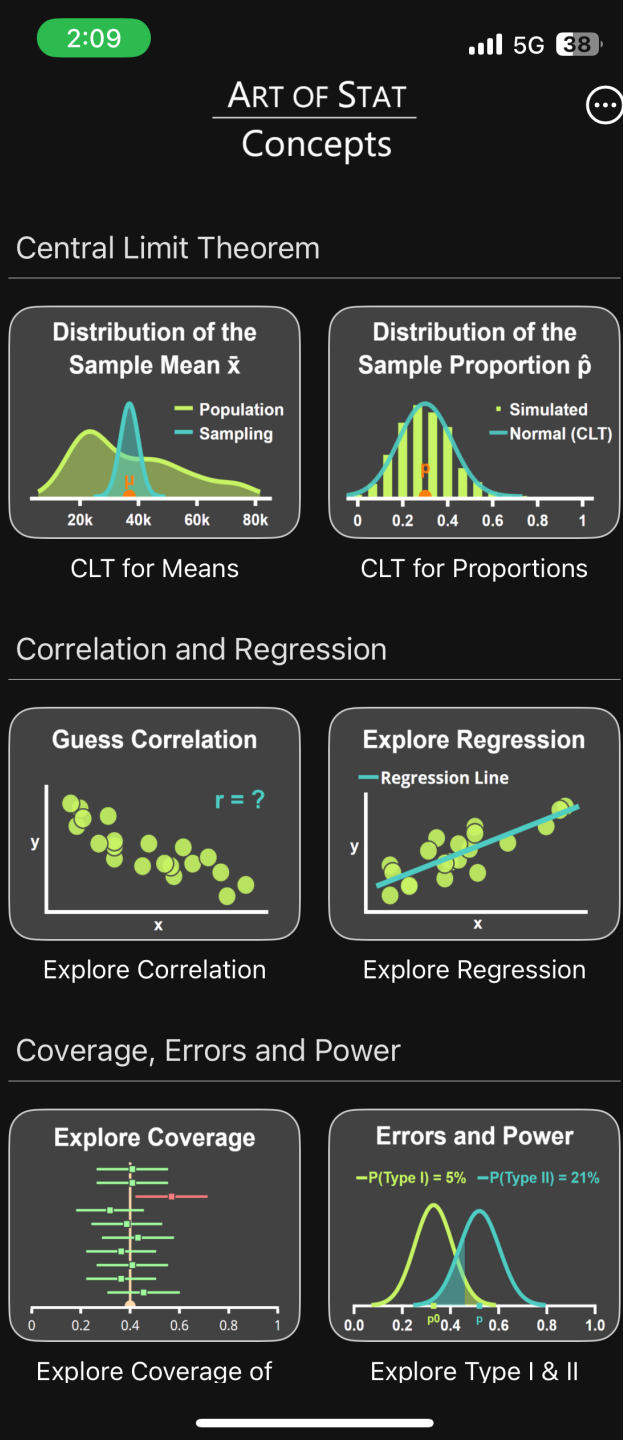
FITTED MODEL AND PLOTS

FITTED VALUES AND RESIDUALS

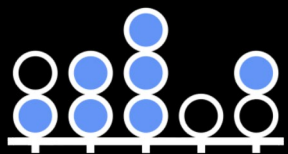
Art of Stat Concepts



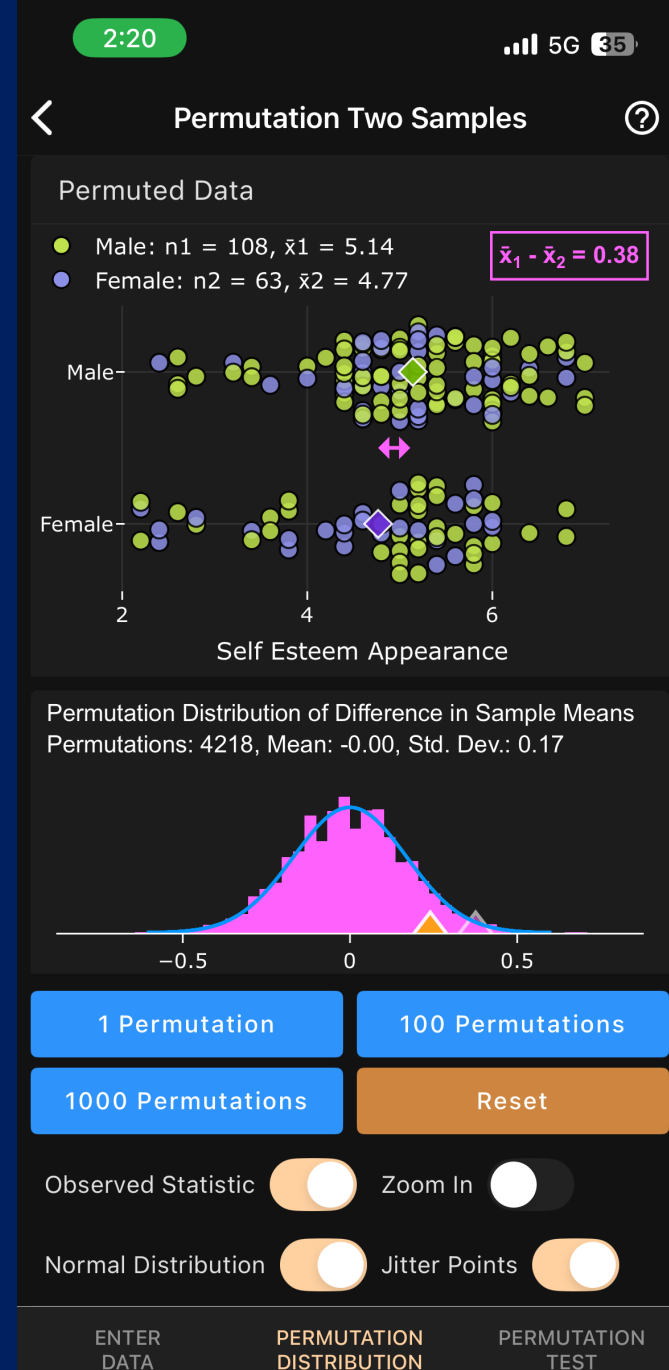
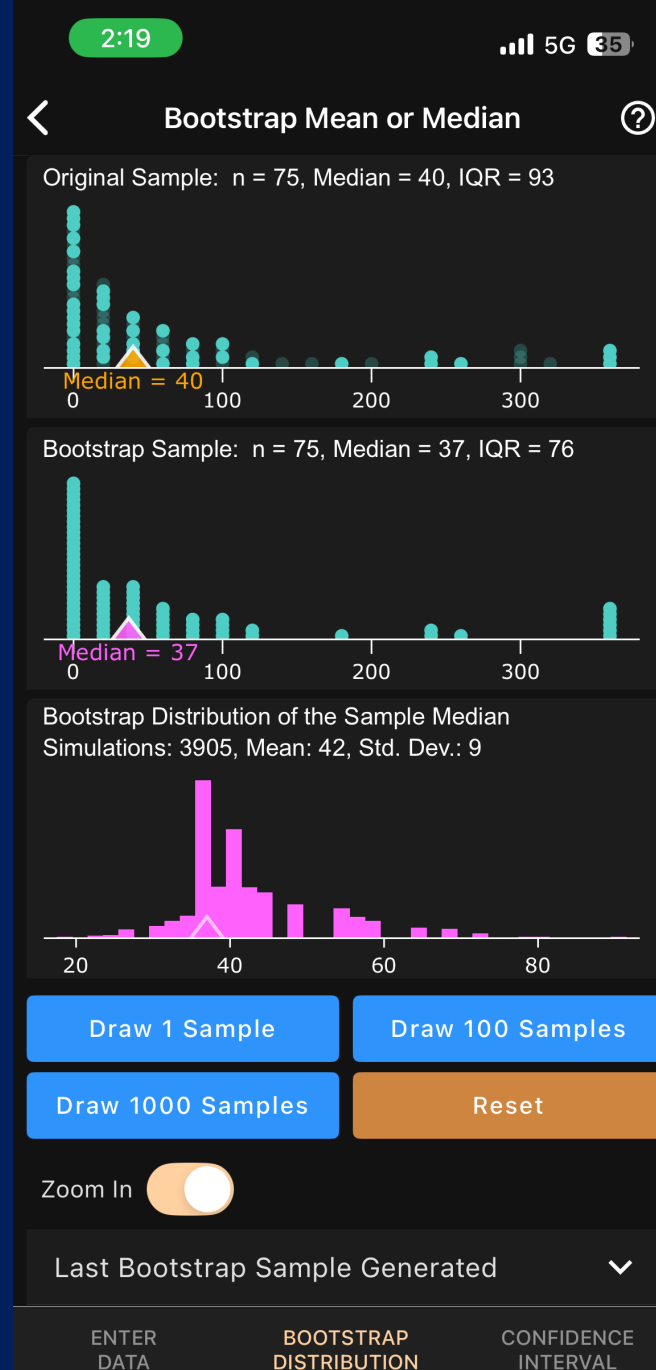
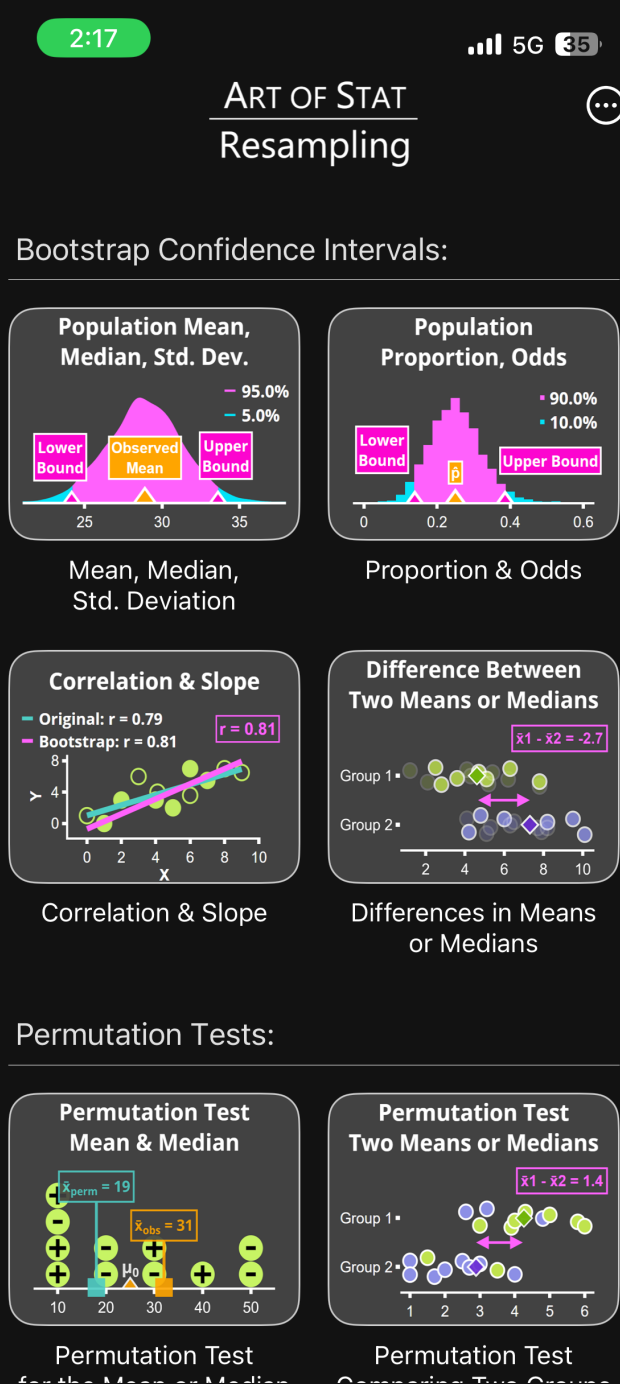
Central Limit Theorem, Correlation, Regression, Coverage & Power



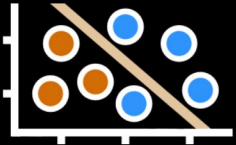
Art of Stat Resampling



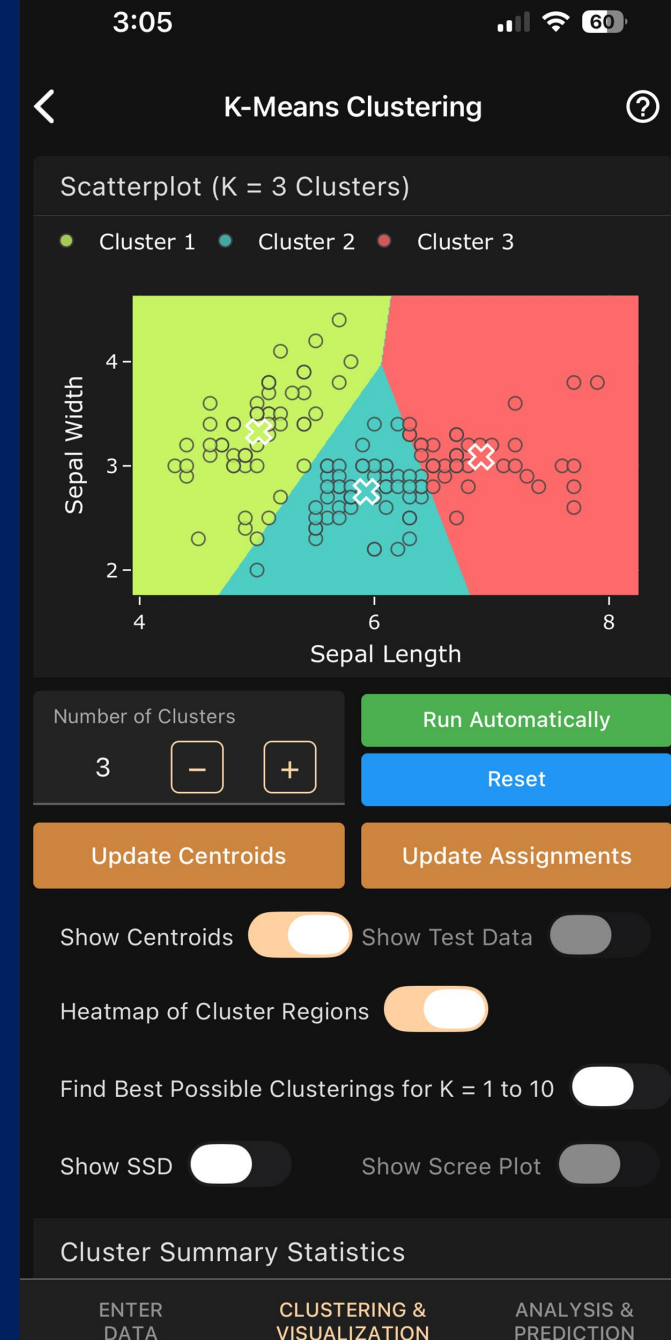
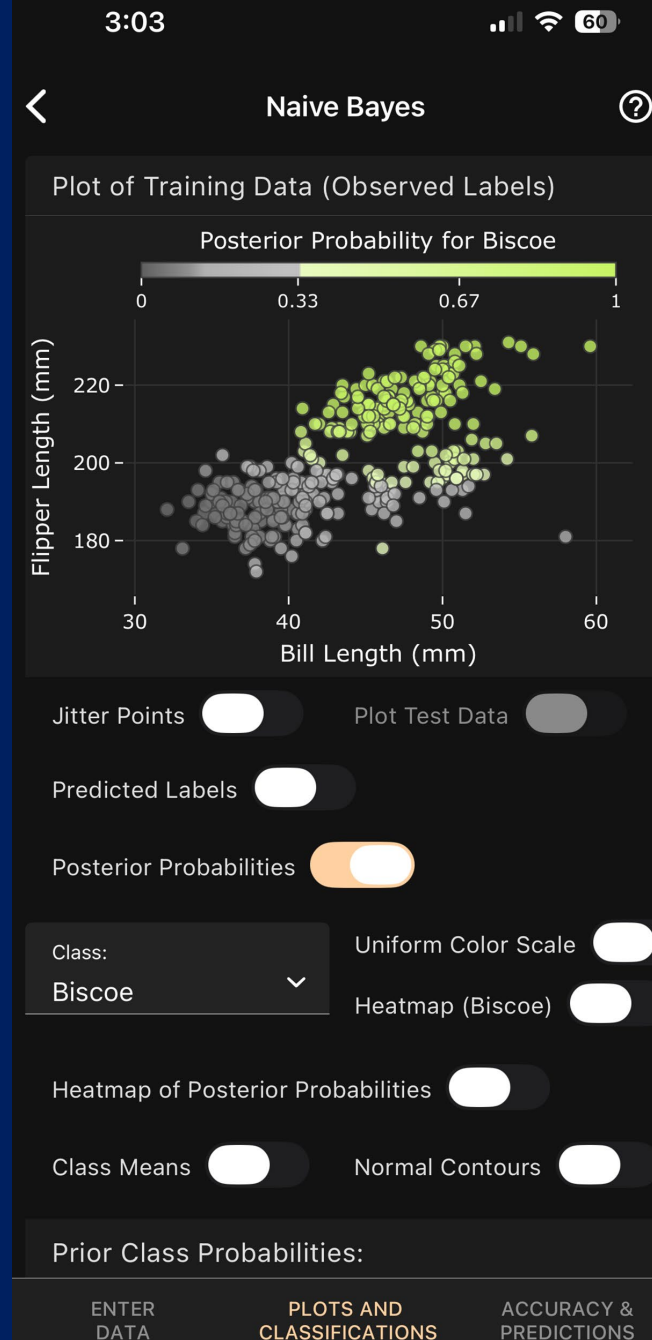
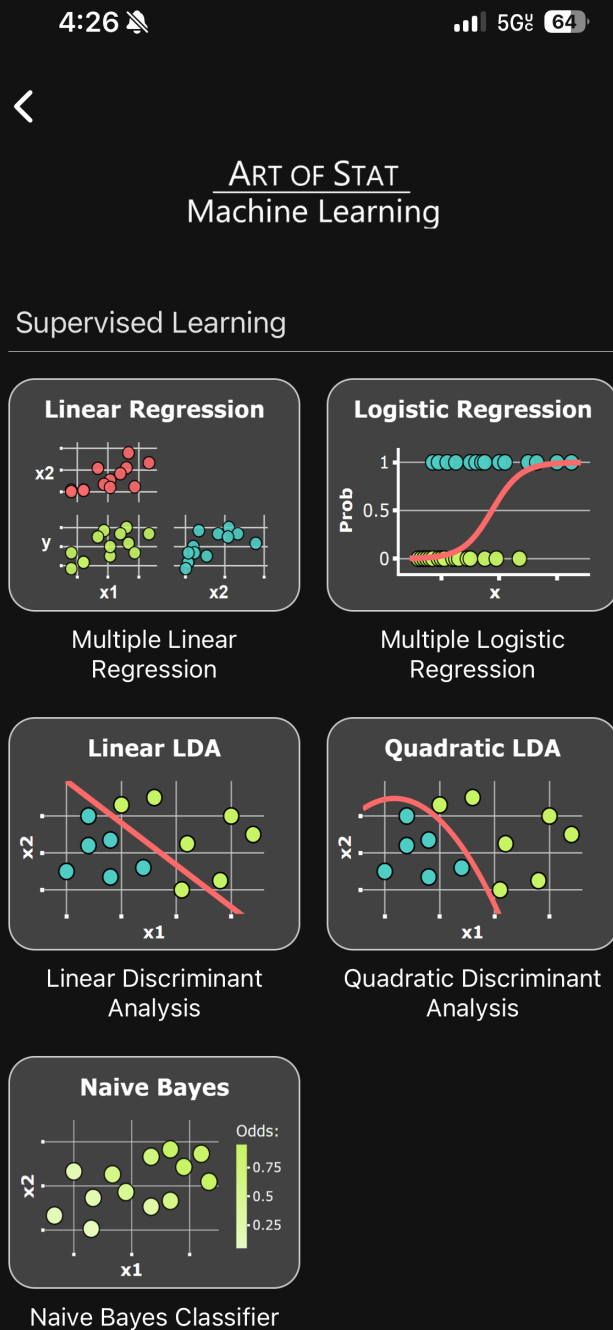
Bootstrap Confidence Intervals. Permutation Tests. For One & Two Samples. Chi-Squared Test.



Art of Stat M-Learning

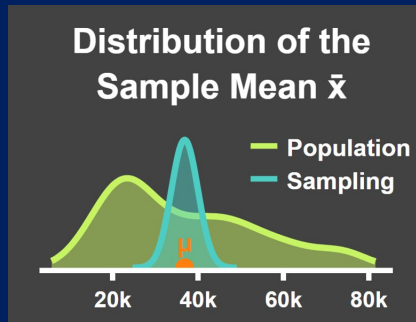


Classical Methods for Supervised & Unsupervised Learning



Art of Stat: Concepts

Central Limit Theorem for Means



Screens:

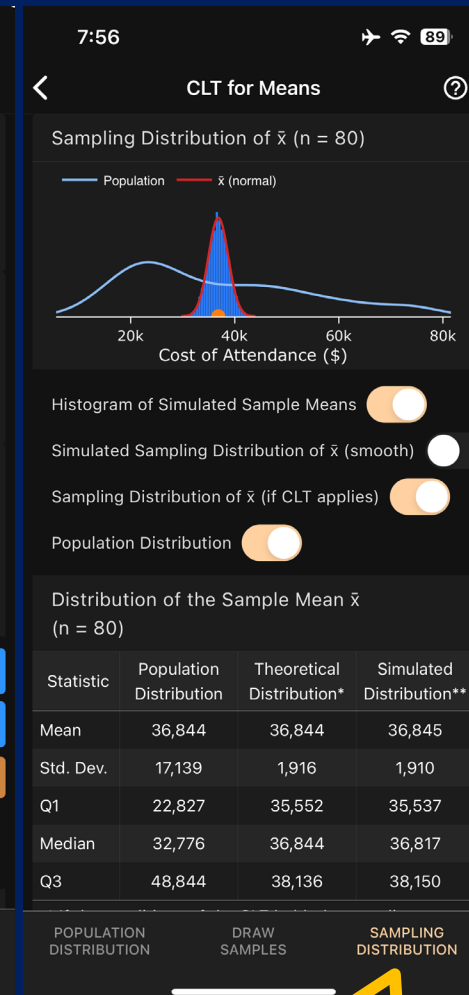
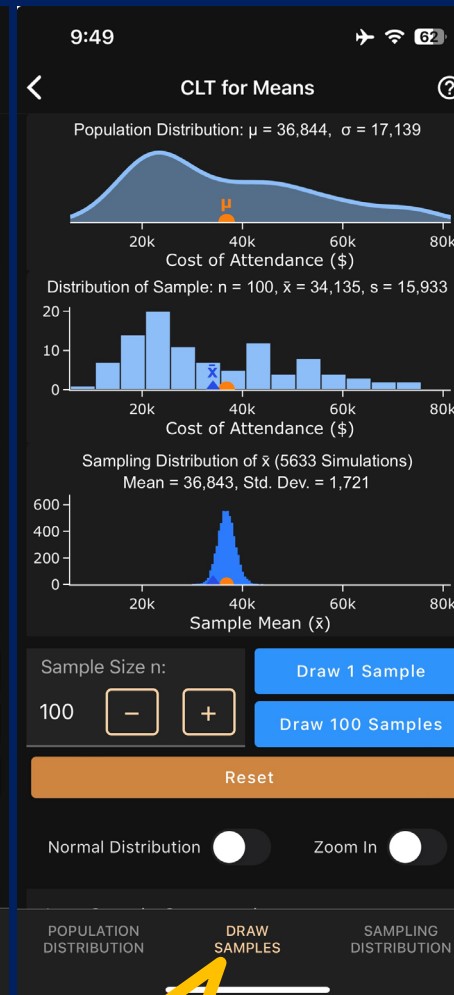
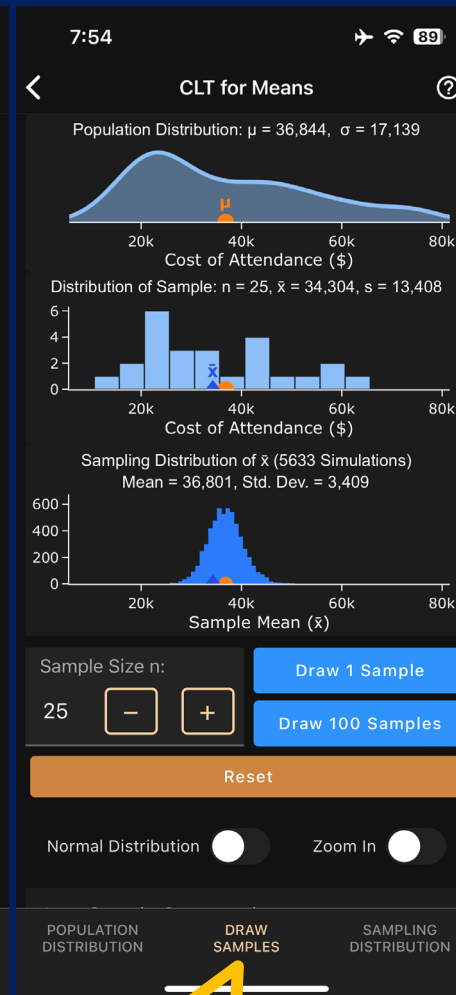
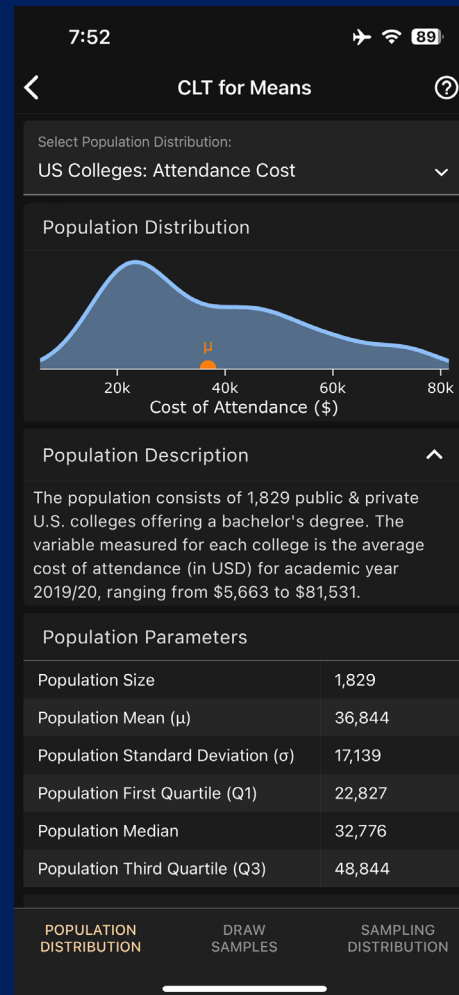
- Population Distribution
- Draw Samples
- Sampling Distribution

Explore real population distribution, and its parameters (mean, standard deviation).

Draw samples of a given size from this population distribution, and keep track of the sample means

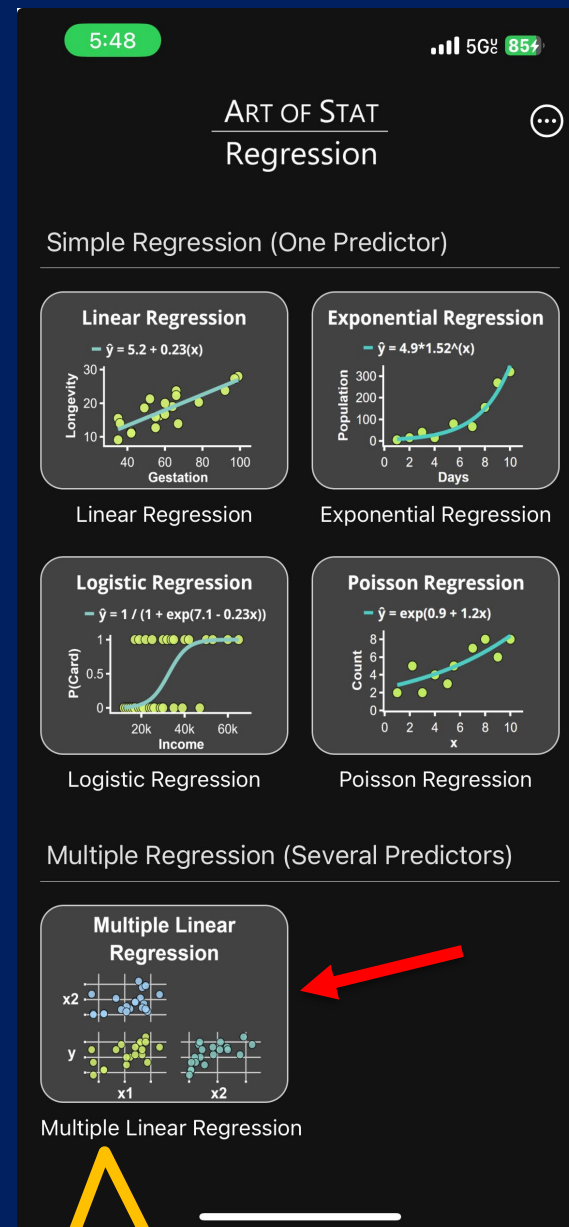
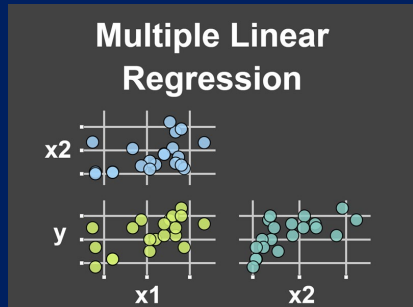
See what happens as the sample size increases

Show (simulated) sampling distribution, compare to population distribution

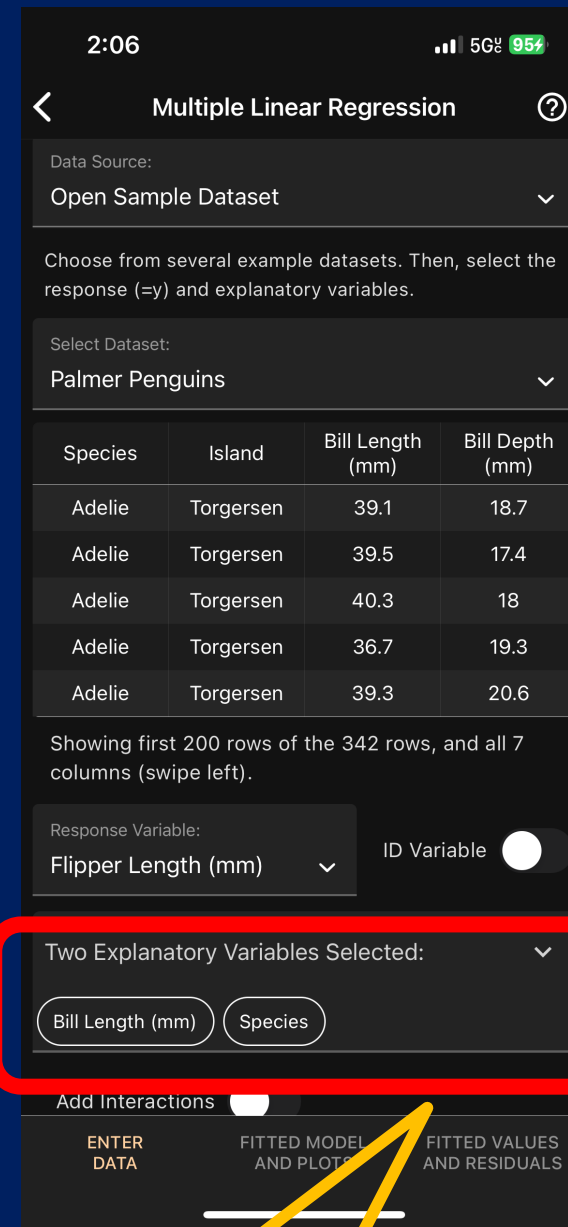


Art of Stat: Regression

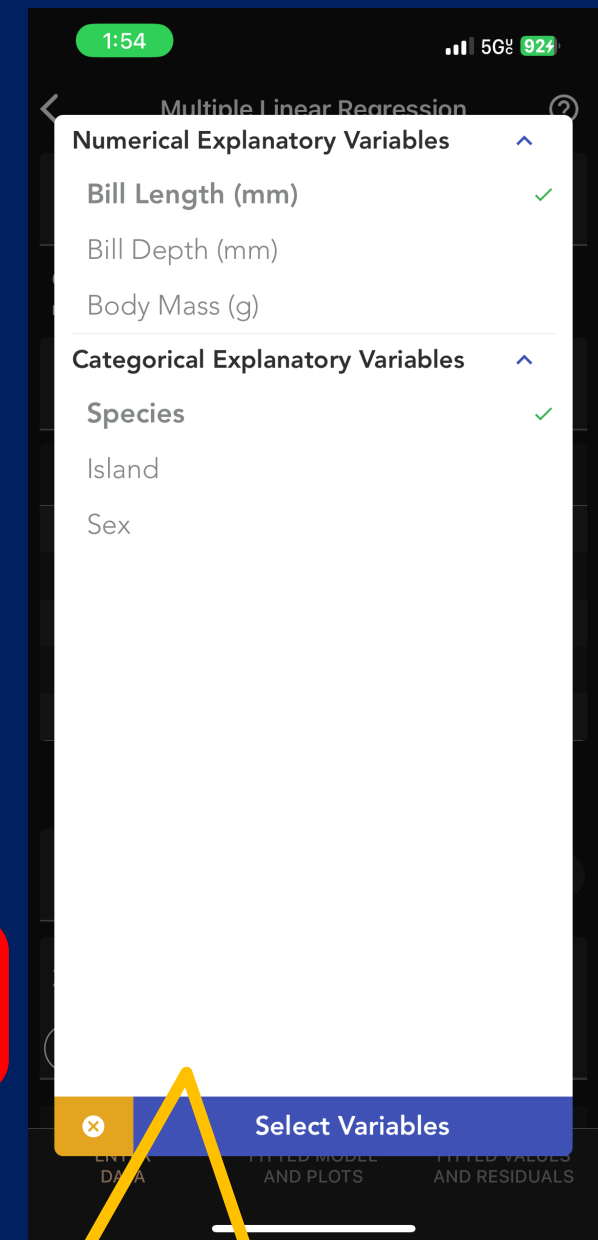
Multiple Linear Regression



Select Multiple
Linear Regression



Select response &
explanatory variables

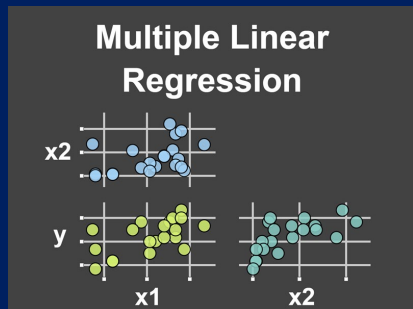


Click on variables you want to
select, continuous or categorical

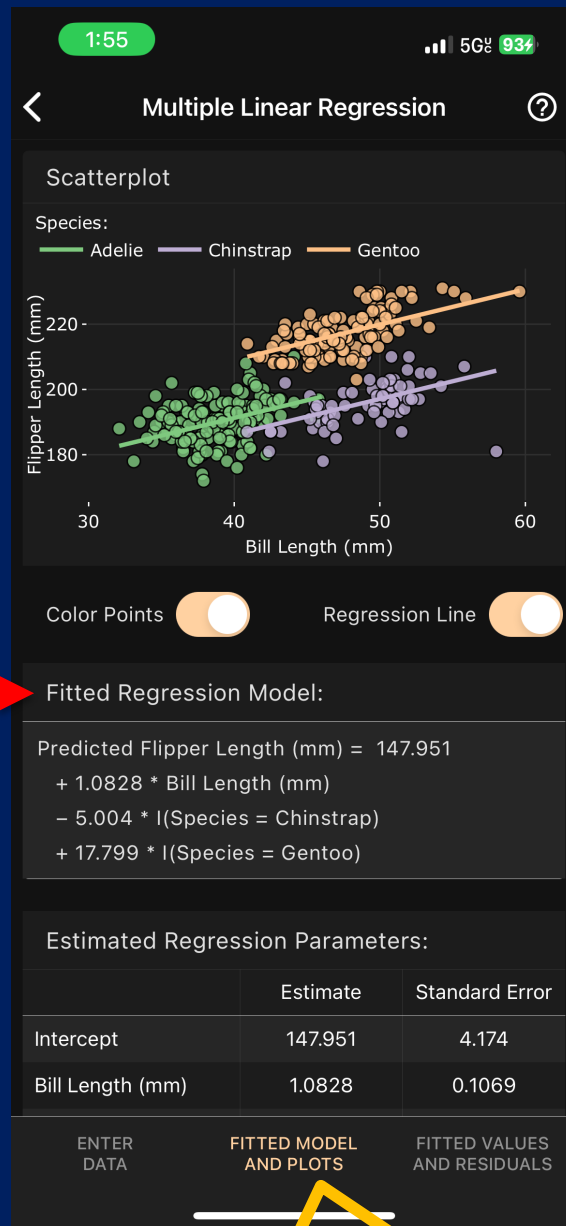
- Screens:
- Enter Data
 - Fitted Model & Plots
 - Fitted Values, Residuals

Art of Stat: Regression

Multiple Linear Regression



- Screens:
- Enter Data
 - Fitted Model & Plots
 - Fitted Values, Residuals



Three separate lines, and equation for fitted model

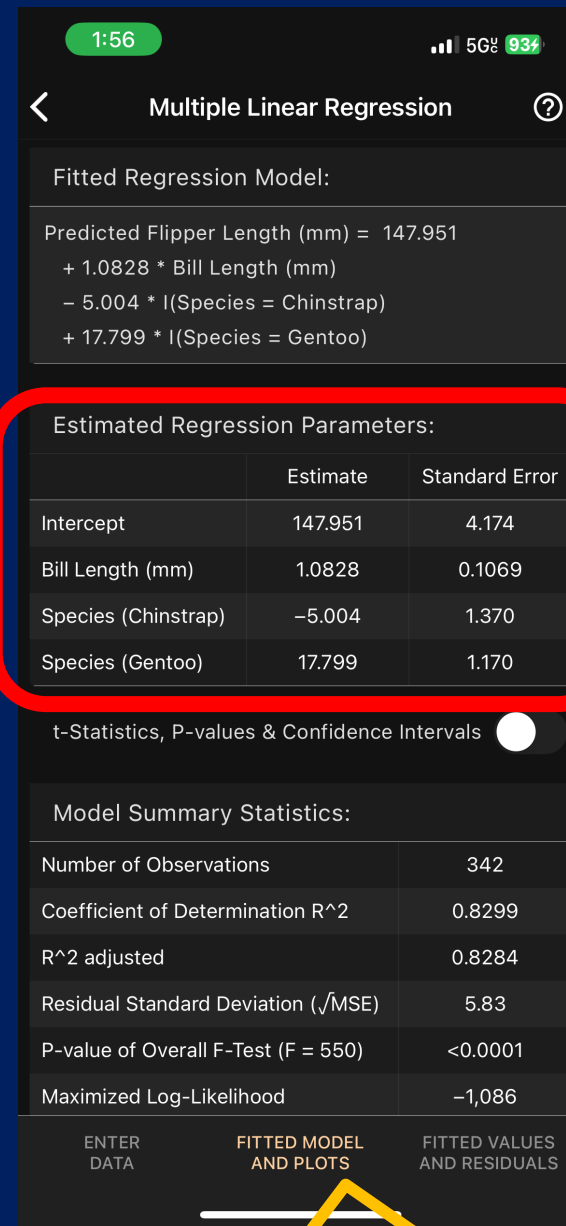
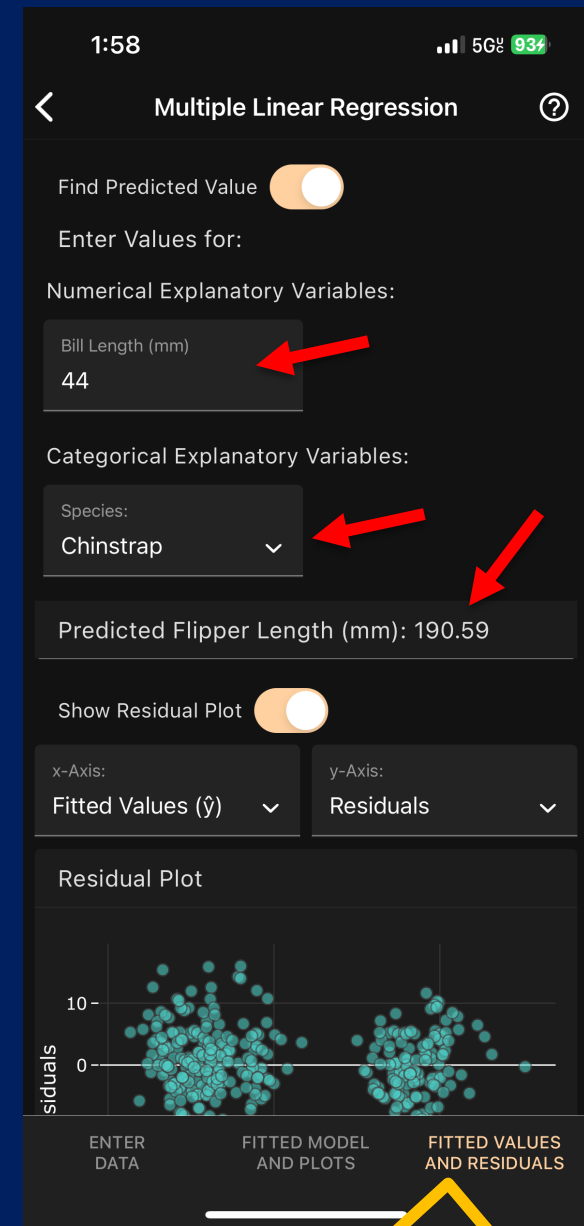


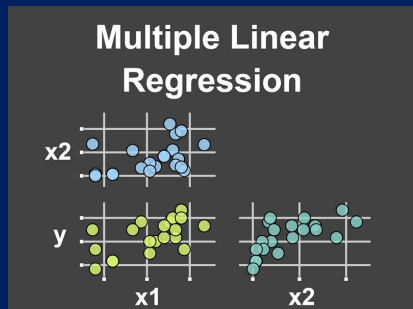
Table of regression coefficient, plus std. errors and P-values



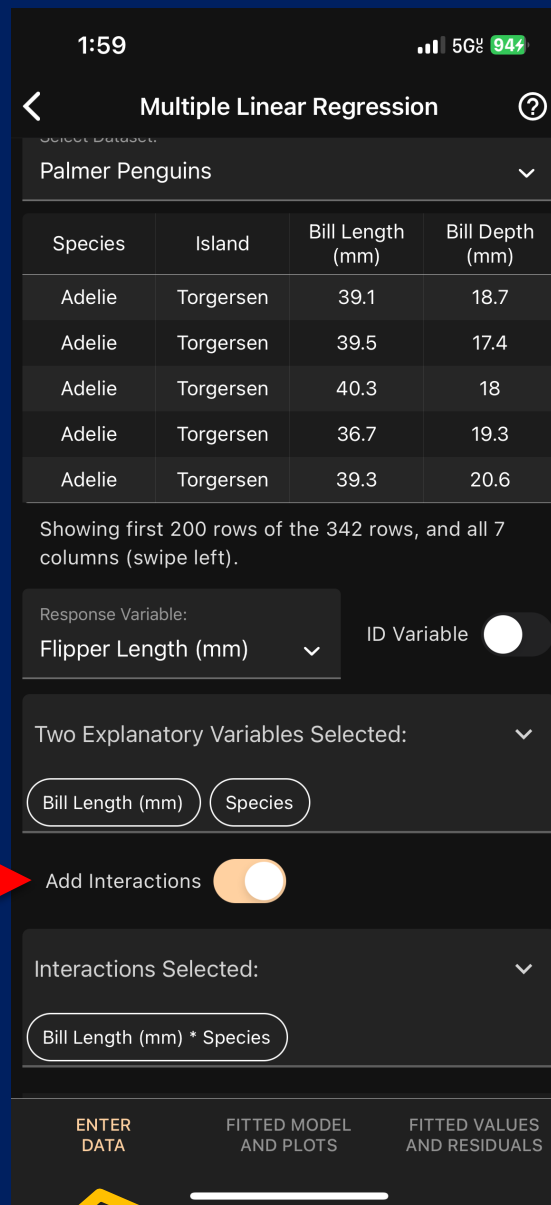
Prediction: drop-downs for categorical predictors

Art of Stat: Regression

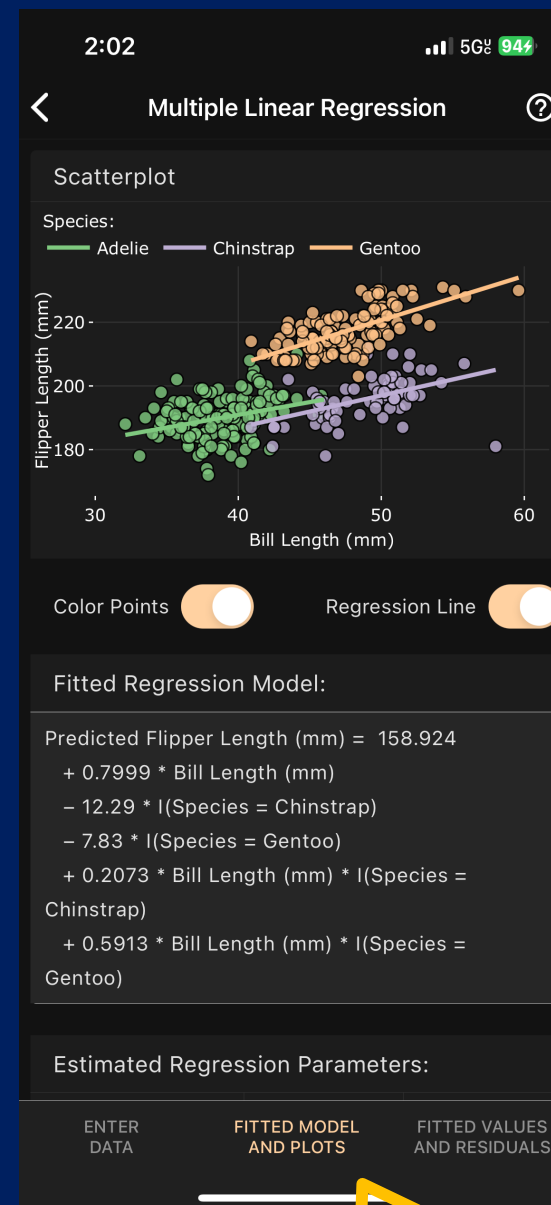
Multiple Linear Regression



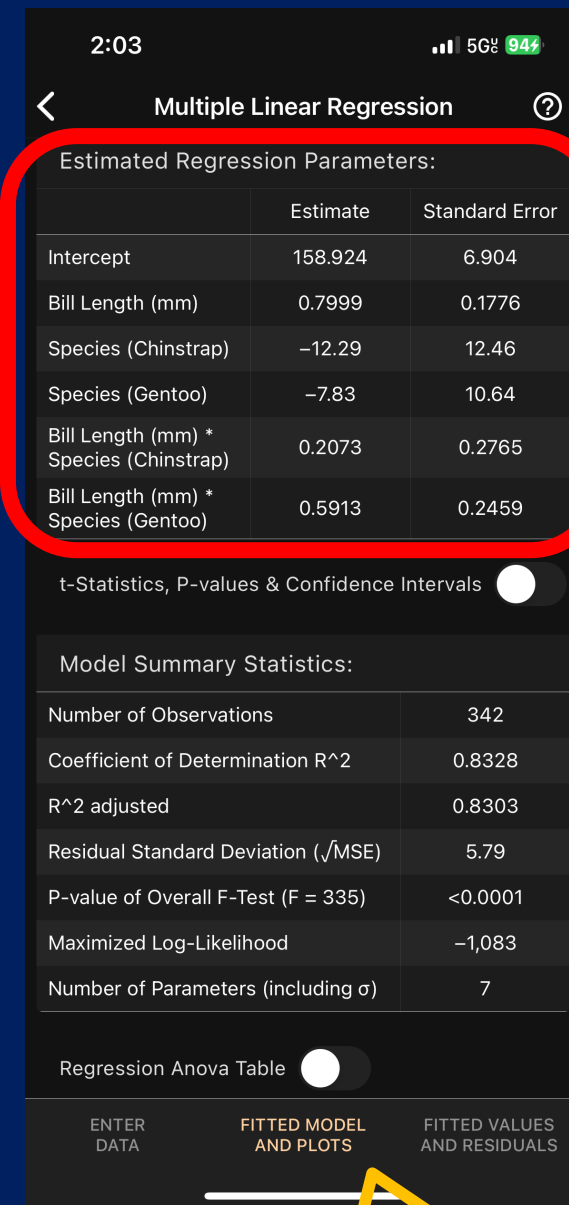
- Screens:
- Enter Data
 - Fitted Model & Plots
 - Fitted Values, Residuals



Multivariate Thinking also means understanding Interactions



Now we have different slopes: different effects



Regression coefficient table easy to read