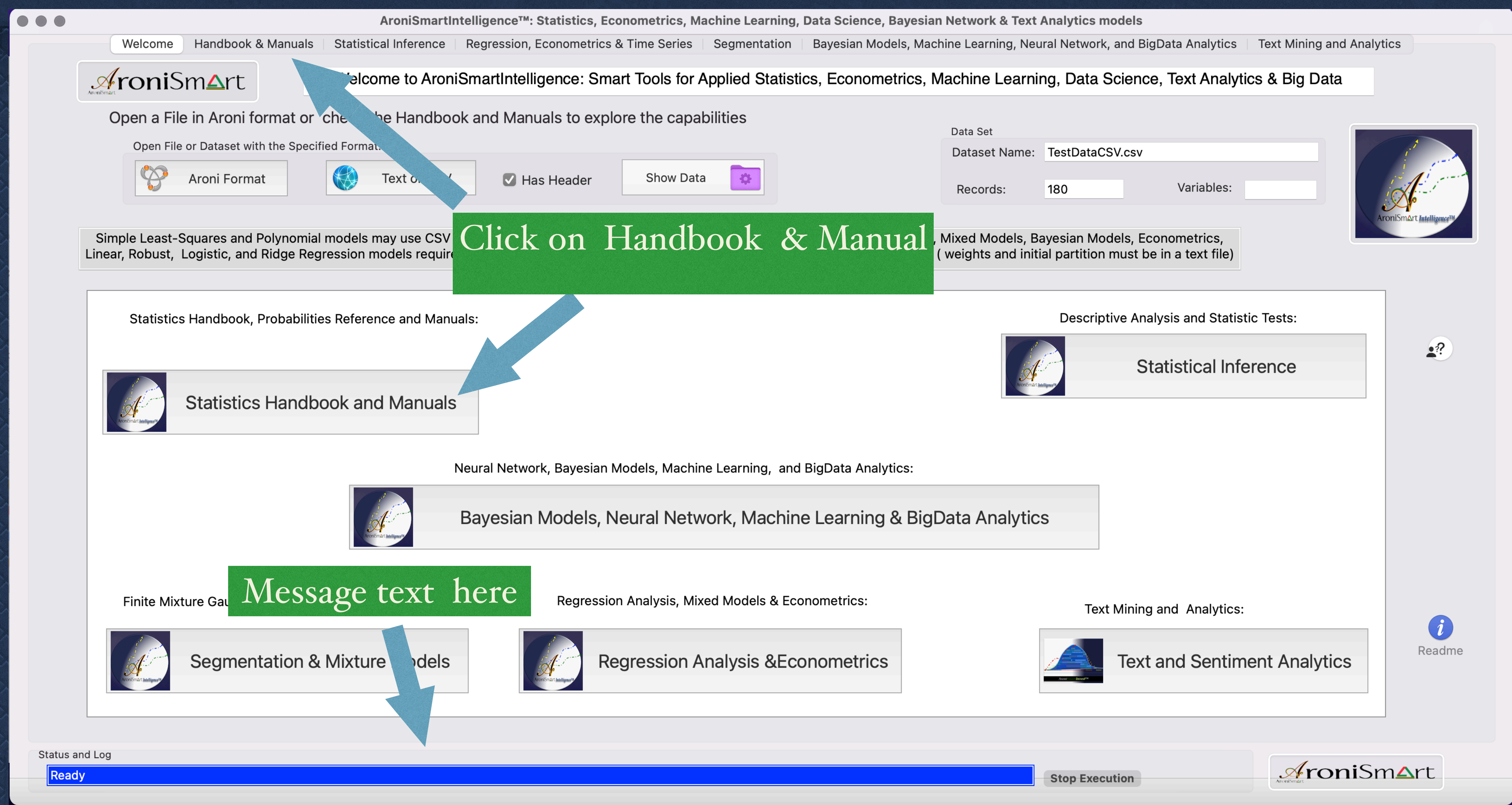




SmartIntelligence  
Machine Learning  
DataScience  
Applied Statistics  
Econometrics  
Text Analytics  
Bayesian Models  
Neural Networks

*AroniSmartIntelligence™ Tutorial*  
***Part I: Handbook and Manual Module***

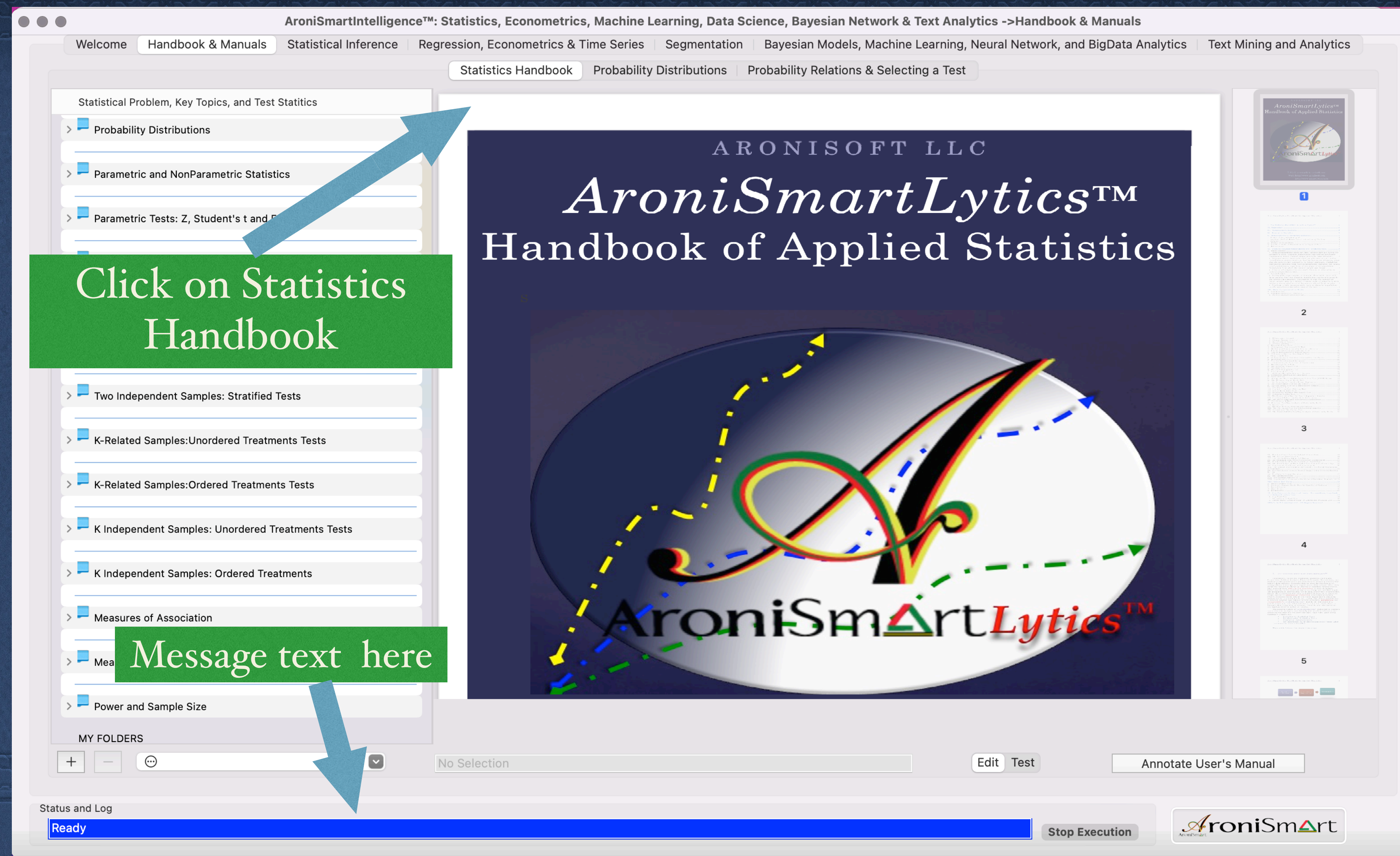




# AroniSmartIntelligence User Interface

*Click Handbook & Manual tab or button from AroniSmartIntelligence™ interface to access the module*





**AroniSmartIntelligence User Interface**  
*Click Statistics Handbook tab from AroniSmartIntelligence™ interface to access the module*



AroniSmartIntelligence™: Statistics, Econometrics, Machine Learning, Data Science, Bayesian Network & Text Analytics ->Handbook & Manuals

Welcome Handbook & Manuals Statistical Inference Regression, Econometrics & Time Series Segmentation Bayesian Models, Machine Learning, Neural Network, and BigData Analytics Text Mining and Analytics

Statistics Handbook Probability Distributions Probability Relations & Selecting a Test

Statistical Problem, Key Topics, and Test Statistics

Probability Distributions

Parametric and NonParametric Statistics

Parametric vs NonParametric Statistics

Parametric Test: Z, Student's t and F Test

One sample Tests

Two Related Samples Tests

K-Related Samples:Unordered Treatments Tests

K-Related Samples:Ordered Treatments Tests

K Independent Samples: Unordered Treatments Tests

K Independent Samples: Ordered Treatments

Measures of Association

Measures of Agreement

+

-

☺

Parametric vs NonParametric Statistics

Edit Test

Annotate User's Manual

Status and Log

Ready

Screenshot

AroniSmart

Select a handbook Topic to focus on here including a chapter and section

Check the User's manual

Click on the selected chapter and section of the Handbook

**AroniSmartLytics™.**

parametric statistics commonly lacks or has limited robustness. Use formulas to describe the parameters, and the statistics, making their nature simple.

**V. Nonparametric vs Parametric Statistics.**

The choice between **Nonparametric** and **parametric statistics** may be tricky and not obvious. **AroniSmartLytics™** simplifies the problem. The choice of a statistics test is based on mostly three criteria:

- **Nature of the problem or goal**
- **Levels or Scale of Measurement and nature of the data**
- **Robustness**

The combination of the **nature of the problem** and the **scale of measurement** determine the family of statistical tests to use. Robustness determines the type of the test, and ultimately the test itself.

**A. Nature of the problem.**

# AroniSmartIntelligence User Interface

Using AroniSmartIntelligence™ Statistics Handbook



















## Hypergeometric (N,M,K) Distribution

## Discrete Probability Distributions:

UniformDiscrete  
Binomial  
Poisson  
Bernoulli  
NegativeBinomial  
Hypergeometric

K  
M  
N  
x

## Continuous Probability Distributions:

Weibull  
Normal  
Logistic  
DoubleExponential  
Gamma  
Chisquared

Probability Value:

Lower: 0

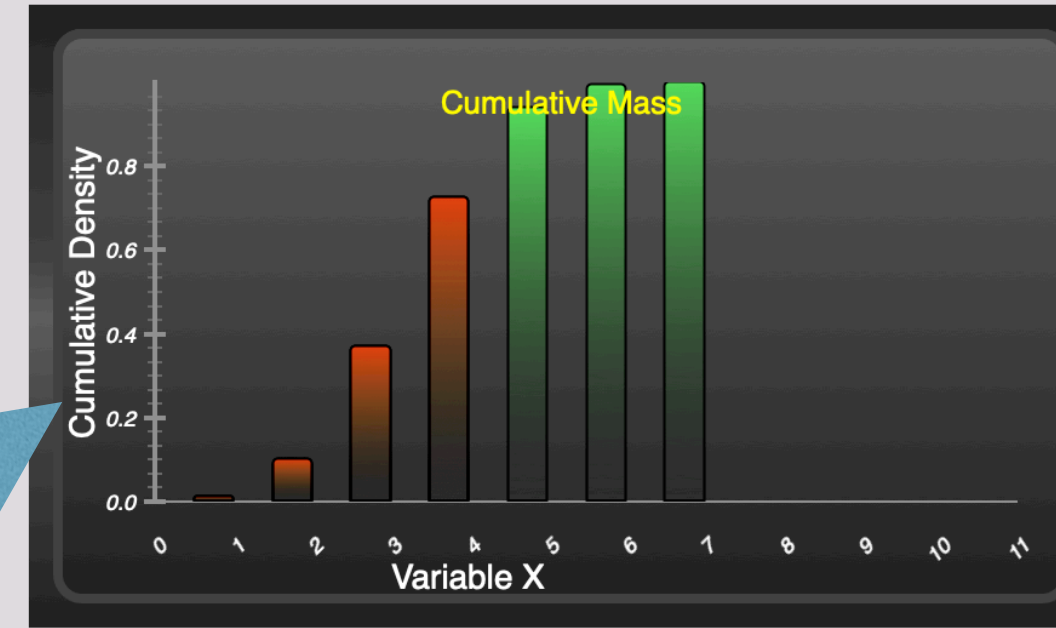
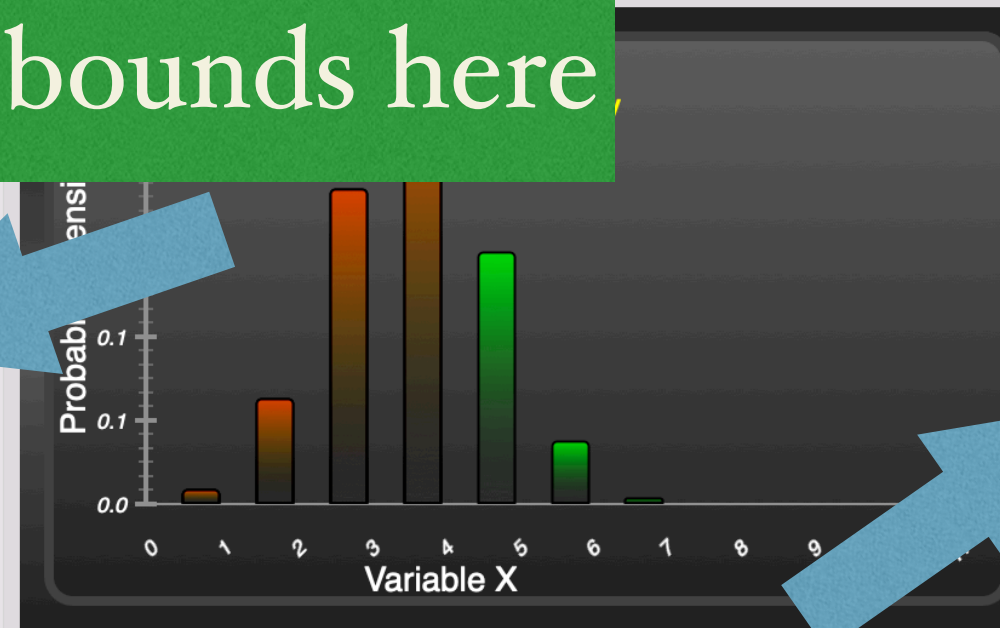
Variable Range:

Upper: 4

Lower: 0

Refresh Graphs

2- Enter bounds here



3- Refresh graph

4- Observe the changes in graphs

## Input Parameters:

μ, alpha, theta, gamma, or a

Sample size (M, n, or n)

Std( sigma)

lambda, h

df 1(v)

1- Enter needed parameters

Sample Success or x

Population Success (K)

Probability of Success (p)

Green			
Other	$K - x$	$N + x - K - M$	$N - M$
Total	$K$	$N - K$	$N$

Statistic	Formula: X	Comment: Y=(X-1)
pmf	$P(X = x   N, M, K) = \frac{\binom{M}{x} \binom{N-M}{K-x}}{\binom{N}{K}};$ $x \in \{\max(0, K + M - N), \dots, \min(M, N)\}$ $M - (N - K) \leq x \leq M; N, M, K \geq 0$	$N \in \{1, 2, \dots\}$ $M \in \{0, 1, 2, \dots, N\}$ $K \in \{1, 2, \dots, N\}$
cdf	$P(X \leq x) = 1 - (1 - p)^x$	$1 - (1 - p)^{x+1}$
mean	$KM$	$KM$

Status and Log

Ready

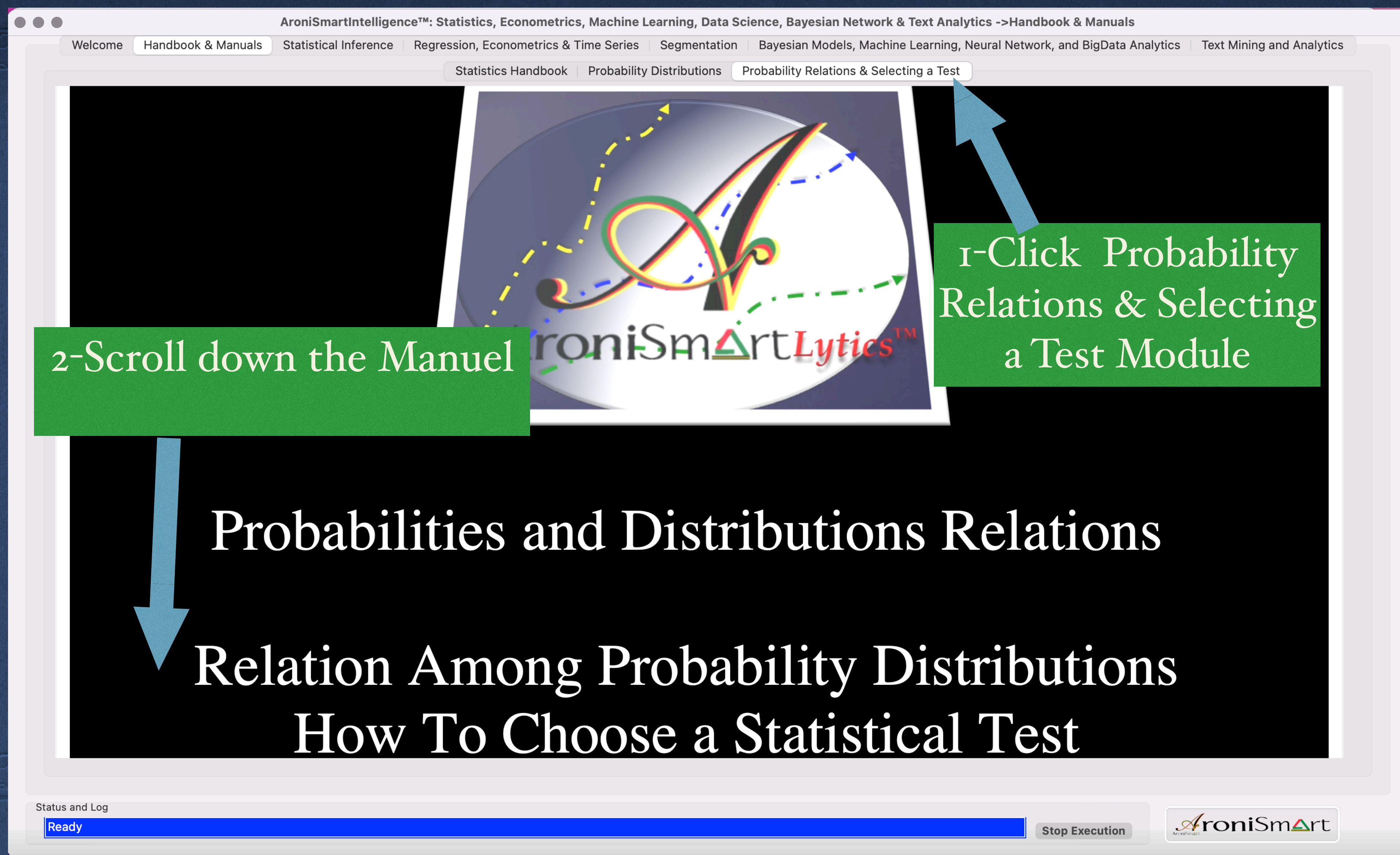
Screenshot

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# AroniSmartLytics Probability Distributions

## Hypergeometric Distribution Example - parameters change





# AroniSmartIntelligence User Interface

*Using AroniSmartIntelligence™ Probability Relations and & Selecting a Test*



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Statistics Handbook Probability Distributions Probability Relations & Selecting a Test

# Relation Among Probability Distributions

## How To Choose a Statistical Test

2-Check the user's Manual

### Common Probability Distributions Relationships

Solid lines represent transformations and special cases. Dashed lines represents limits.

```

graph TD
    Uniform[Uniform] -- "α = β = 1" --> Beta["Beta(α,β)"]
    Beta -- "α = β = 1" --> DiscreteUniform[Discrete Uniform]
    Beta -- "α = β → ∞" --> Binomial[Binomial]
    Beta -- "X₁/(X₁+X₂)" --> Gamma["Gamma(r,λ)"]
    Gamma -- "r = 1" --> Weibull["Weibull(v,λ)"]
    Weibull -- "γ = 1" --> Uniform
    Weibull -- "X^(1/γ)" --> Gamma
    Gamma -- "e^(-X/λ)" --> Uniform
    Gamma -- "-λ log X" --> Uniform
    BetaBinomial[Beta-binomial] -- "α = β = 1" --> DiscreteUniform
    BetaBinomial -- "p = α/(α+β), α+β → ∞" --> Binomial
    Hypergeometric[Hypergeometric(M,N,K)] -- "p = M/N, n = K, N → ∞" --> Binomial
    Binomial -- "μ = np, σ² = np(1-p)" --> Binomial
  
```

Status and Log

Ready

Stop Execution

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AroniSmartIntelligence User Interface

Using AroniSmartIntelligence™ Probability Relations and Selecting a Test



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Student's t (v)  $\chi^2$   $v \rightarrow \infty$   $X1-X2$  **Lognormal**  $\prod X_i$  **Geometric (p)**  $\min X_i$

Cauchy (0, σ)  $v=1$   $\Sigma X_i$   $1/X$

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**Explore the Handbook**

Test

Use Mann-Witney-Wilcoxon Tests

one or Two  $\chi^2_{n-1} = \frac{(n-1)s^2}{\sigma_0^2}$   $F_{v_1, v_2} \frac{s_1^2}{s_2^2}$  **One** **Two** **Variance**

Statistic Problem **Test mean, proportion or variance** **Mean** **Proportion**

one or Two **Two** **One**

$y_1$  and  $y_2$  normal? **Yes** **No**  $n < 30$   $n \geq 30$

$\sigma_1^2 = \sigma_2^2$  or  $\sigma_1^2 \neq \sigma_2^2$   $\sigma_1^2 \neq \sigma_2^2$   $\sigma_1^2 = \sigma_2^2$  **Paired** **Yes** **No**

$t_{n_1+n_2-2} = \frac{(\bar{y}_1 - \bar{y}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$

$s^2 = \frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$

Status and Log Ready Screenshot AroniSmart

# AroniSmartIntelligence User Interface

## Using AroniSmartIntelligence™ Probability Relations and & Selecting a Test



