

$$Rows(A) := 0, 1 \dots rows(A) - 1$$

$$Cols(A) := 0, 1 \dots cols(A) - 1$$

$$NaN := \infty$$

$$ravel(X) := \left\| \begin{array}{l} v \leftarrow NaN \\ \text{for } x \in X \\ \left\| \begin{array}{l} v_{rows(v)} \leftarrow x \end{array} \right\| \\ v \end{array} \right\|$$

$$cons(a, b) := [a \ b]$$

$$replicate(p, v) := \left\| \begin{array}{l} \text{if IsScalar}(v) \\ \left\| \begin{array}{l} v_0 \leftarrow v \\ X \leftarrow cons(p, v) \\ V \leftarrow NaN \\ \text{for } x \in X \\ \left\| \begin{array}{l} [r \ e] \leftarrow x \\ \text{if } r > 0 \\ \left\| \begin{array}{l} \text{for } i \in 1, 2 \dots r \\ \left\| V_{rows(V)} \leftarrow e \end{array} \right\| \end{array} \right\| \\ V \end{array} \right\| \end{array} \right\|$$

$$Vec2Vec\&Size(V) := \left\| \begin{array}{l} W \leftarrow V \\ n \leftarrow rows(W) \\ \text{if } n = 1 \\ \left\| \begin{array}{l} W \leftarrow V^T \\ n \leftarrow rows(W) \end{array} \right\| \\ [W \ n] \end{array} \right\|$$

$$Rep(f, V, P) := \left| \begin{array}{l} (W \ n) \leftarrow Vec2Vec\&Size(V) \\ g \leftarrow f \\ j \leftarrow 0 \\ \text{while } j < n \\ \left| \begin{array}{l} g \leftarrow g \text{ substitute } W_j = P_j \rightarrow \\ j \leftarrow j + 1 \end{array} \right| \end{array} \right| g$$

$$\left[I_{dist} \ I_{cum} \ I_{invcum} \ I_{rand} \ I_{est} \right] := \left[1 \ 2 \ 3 \ 4 \ 5 \right]$$

$$Histogram(X) := \left\| \begin{array}{l} N \leftarrow \text{length}(X) \\ \text{if } N < 3 \\ \quad \left\| \text{error} \left(\text{“Histogram requires at least three data points”} \right) \right\| \\ X \leftarrow \text{sort}(X) \\ n \leftarrow \text{round} \left(N^{\frac{4}{6}} \right) - 1 \\ \Delta \leftarrow \infty \\ \text{for } i \in 0 .. \text{rows}(X) - n - 1 \\ \quad \left\| \begin{array}{l} \text{if } X_{i+n} - X_i < \Delta \\ \quad \left\| \Delta \leftarrow X_{i+n} - X_i \right\| \end{array} \right\| \\ m \leftarrow \text{round} \left(\frac{X_{\text{last}(X)} - X_0}{\Delta} \right) \\ \text{histogram}(m, X) \end{array} \right\|$$

$$HistogramN(X) := \left\| \begin{array}{l} h \leftarrow Histogram(X) \\ h^{(1)} \leftarrow \frac{h^{(1)}}{\text{length}(X) \cdot (h_{1,0} - h_{0,0})} \\ h \end{array} \right\|$$

$$StatApply1v(x, f, p) := \left\| \begin{array}{l} \text{if } \text{IsScalar}(p) \\ \quad \left\| \overrightarrow{f(x, p)} \right\| \\ \text{if } \text{rows}(p) = 1 \\ \quad \left\| \overrightarrow{f(x, p_0)} \right\| \\ \text{if } \text{rows}(p) = 2 \\ \quad \left\| \overrightarrow{f(x, p_0, p_1)} \right\| \\ \text{if } \text{rows}(p) = 3 \\ \quad \left\| \overrightarrow{f(x, p_0, p_1, p_2)} \right\| \\ \text{if } \text{rows}(p) = 4 \\ \quad \left\| \overrightarrow{\hspace{1.5cm}} \right\| \end{array} \right\|$$

$$LLikelihood(p, D, X) := \left\| \left\| f(x, p_0, p_1, p_2, p_4) \right\| \right\| \left\| \begin{array}{l} l \leftarrow 0 \\ \text{for } x \in X \\ \left\| l \leftarrow l + \ln \left(StatApply1v \left(x, D_{0, I_{dist}}, p \right) \right) \right\| \\ l \end{array} \right\| \right\|$$

$$MaxLikelihoodP(p, D, X) := \text{Maximize}(LLikelihood, p)$$

$$MaxLikelihood(X, D) := MaxLikelihoodP(D_{0, I_{est}}(X), D, X)$$

$$\begin{array}{l} StatApply1v(X, f, p) = Y \\ genfit(X, Y, f, p) := \text{Minerr}(p) \end{array}$$

$$FitPDF(X, D) := \left\| \begin{array}{l} h \leftarrow HistogramN(X) \\ genfit(h^{(0)}, h^{(1)}, D_{0, I_{dist}}, D_{0, I_{est}}(X)) \end{array} \right\|$$

$$FitCDF(X, D) := \left\| \begin{array}{l} X \leftarrow \text{sort}(X) \\ c \leftarrow ravel(Rows(X)) \div \text{last}(X) \\ genfit(X, c, D_{0, I_{cum}}, D_{0, I_{est}}(X)) \end{array} \right\|$$

Normal Distribution

$$EstNorm(X) := \left[\begin{array}{l} \text{mean}(X) \\ \text{Stdev}(X) \end{array} \right]$$

Loa Normal Distribution

$$EstLogNorm(X) := \begin{bmatrix} \text{mean}(\overrightarrow{\ln(X)}) \\ \text{Stdev}(\overrightarrow{\ln(X)}) \end{bmatrix}$$

Gamma Distribution

$$Dgamma(x, C, S) := \frac{dgamma\left(\frac{x}{C}, S\right)}{C}$$

$$Pgamma(x, C, S) := pgamma\left(\frac{x}{C}, S\right)$$

$$Qgamma(p, C, S) := C \cdot qgamma(p, S)$$

$$Rgamma(n, C, S) := C \cdot rgamma(n, S)$$

$$EstGamma(X) := \left\| \begin{array}{l} \mu \leftarrow \text{mean}(X) \\ C \leftarrow \frac{\text{var}(X)}{\mu} \\ \left[\begin{array}{c} C \\ \mu \\ C \end{array} \right] \end{array} \right\|$$

Weibull Distribution

$$Dweibull(x, C, S) := \frac{dweibull\left(\frac{x}{C}, S\right)}{C}$$

$$Pweibull(x, C, S) := pweibull\left(\frac{x}{C}, S\right)$$

$$Qweibull(p, C, S) := C \cdot qweibull(p, S)$$

$$Rweibull(n, C, S) := C \cdot rweibull(n, S)$$

$$EstWeibull(X) := \left\| \begin{array}{l} X \leftarrow \text{sort}(X) \\ C \leftarrow X_{\text{round}(.63212 \cdot \text{length}(X))} \\ S \leftarrow \frac{1}{\ln\left(\frac{C}{X_{\text{round}(.3078 \cdot \text{length}(X))}}\right)} \\ \begin{bmatrix} C \\ S \end{bmatrix} \end{array} \right\|$$

$$DNorm := [2 \text{ dnorm } \text{pnorm } \text{qnorm } \text{rnorm } EstNorm]$$

$$DLNorm := [2 \text{ dlnorm } \text{plnorm } \text{qlnorm } \text{rlnorm } EstLogNorm]$$

$$DGamma := [2 \text{ Dgamma } Pgamma \text{ Qgamma } Rgamma \text{ EstGamma}]$$

$$DWeibull := [2 \text{ Dweibull } Pweibull \text{ Qweibull } Rweibull \text{ EstWeibull}]$$

$$X := \begin{bmatrix} 0.545 \\ 0.956 \\ 0.052 \\ 1.19 \\ 0.111 \\ 1.34 \\ 1.037 \\ 0.898 \\ 2.116 \\ 0.266 \\ 0.241 \\ 1.139 \\ \vdots \end{bmatrix}$$

$$X := \frac{\overrightarrow{X}}{1 + X}$$

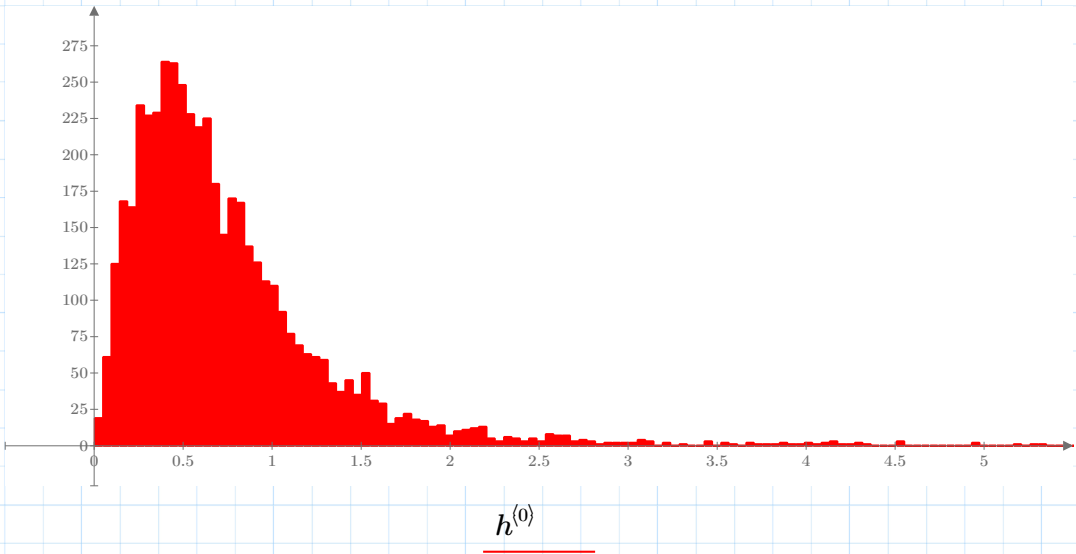
$$X := \text{sort}(X)$$

$$X := \left\| \begin{array}{l} v \leftarrow NaN \\ \text{for } x \in X \\ \left\| \begin{array}{l} \text{if } x \neq 0 \\ \left\| v_{rows(v)} \leftarrow x \right\| \end{array} \right\| \end{array} \right\| v$$

$$h:=Histogram(X)$$

$$MaxX:=X_{round\left(.996\cdot rows\left(X\right)\right)}$$

$$\sqrt{rows(X)}=69.39$$



$$h^{(1)}:=\frac{h^{(1)}}{\text{length}(X)\cdot\left(h_{1,0}-h_{0,0}\right)}$$

$$\boxed{MaxLikelihood(X,DGamma)}=?$$

$$FitPDF(X,DGamma)=\begin{bmatrix}0.29\\2.385\end{bmatrix}$$

$$FitCDF(X,DGamma)=\begin{bmatrix}0.29\\2.385\end{bmatrix}$$

$$\boxed{MaxLikelihood(X,DWeibull)}=?$$

$$FitPDF(X,DWeibull)=\begin{bmatrix}0.731\\1.704\end{bmatrix}$$

$$FitCDF(X,DWeibull)=\begin{bmatrix}0.731\\1.704\end{bmatrix}$$

$$\boxed{MaxLikelihood(X,DLNorm)}=?$$

$$FitPDF(X,DLNorm)=\begin{bmatrix}-0.476\\0.733\end{bmatrix}$$

$$FitCDF(X,DLNorm)=\begin{bmatrix}-0.476\\0.733\end{bmatrix}$$

$$\boxed{MaxLikelihood(\ln(X),DNorm)}=?$$

$$FitPDF(\ln(X),DNorm)=\begin{bmatrix}-0.485\\0.689\end{bmatrix}$$

$$FitCDF(\ln(X),DNorm)=\begin{bmatrix}-0.485\\0.689\end{bmatrix}$$