〈 〉

$\geq$

〈 〉

$r' * y = x \qquad y$

I_ν K_ν

(Γ)

J_ν Y_ν

I_ν K_ν

(Γ)

≥ 0

I_ν K_ν

$e^{-x}I_\nu(x)$ $e^x K_\nu(x)$

$\nu < 0$

$\langle$ $\rangle$

$\Gamma(x)$ $B(x)$

$R'R = x$

R $R'R = x$

$z = x + iy$ x y $r =$ $(z) =$
$\sqrt{x^2 + y^2}$ $\phi =$ (z) $x = r * \cos(\phi)$ $y = r * \sin(\phi)$

$[20, 500]$

$+1 \qquad -1$

$O(n^2)$

p

$p \times p$

k k

n $28 + 8\lceil (n+1)/8 \rceil$

$v_{i_j} \leq x_j < v_{i_j+1}$ $v_0 := -\infty$ $v_{N+1} := +\infty$

$\{1, \ldots, N-1\}$

N $N-1$

$O(n \log N)$

$O(n)$

$nF_n(t; X_1, \ldots, X_n)$ F_n

$X_1, \ldots, X_n$

$= \max(vec)$

n

$\geq$

〈 〉

-1
-1

$\pm 2 \times 10^9$

R QR

R QR

$kappa$

QR

$> \quad 0$

$\log(1+x)$	$\lvert x \rvert \ll 1$	$x \approx -1$
$\exp(x) - 1$	$\lvert x \rvert \ll 1$	

e

10^{-5}

$2^{30} = 1073741824$ $2^{20} = 1048576$

$2^{10} = 1024$

$2^{31} - 1 \approx 2\,10^9$

$n-1$

$$p(x) = z_1 + z_2 x + \cdots + z_n x^{n-1}$$

$n-1$ $p(x)$

$n-1$ n

$> \ 1$

≥ 0

$10^{\lfloor \log_{10}(c) \rfloor}$ $b \leq c < 10b$

u $\{1, 2, 5, 10\}b$ $c/b \in [1, 10)$

$h =$ $f =$

$\leq\ 1024$

$\boldsymbol{Ax} = \boldsymbol{b}$ $\boldsymbol{A}$ $\boldsymbol{b}$

$\boldsymbol{Q}$

$\boldsymbol{R}$

$\boldsymbol{Q}$

$\boldsymbol{Q}$

$\boldsymbol{Q}$ $\boldsymbol{X}$ $\boldsymbol{R}$

$\boldsymbol{X}$

$\boldsymbol{X}$

$\boldsymbol{X}$

$\boldsymbol{Q}$

X

6.9536×10^{12}

2^{60}

$\approx 4.6 \times 10^{18}$

$2^{19937} - 1$

$$X_j = (X_{j-100} - X_{j-37}) \bmod 2^{30}$$

2^{129}

2^{32}

$\geq$

10^{-14}

-1

$O(n^{4/3})$

$$B(a,b) = \frac{\Gamma(a)\Gamma(b)}{\Gamma(a+b)}.$$

$$B(a,b) = \int_0^1 t^{a-1}(1-t)^{b-1}dt$$

$\Gamma(x)$

$$\Gamma(x) = \int_0^\infty t^{a-1}e^{-t}dt$$

$x!$

$\psi(x)$

$$= \psi(x) = \frac{d}{dx}\ln\Gamma(x) = \frac{\Gamma'(x)}{\Gamma(x)}$$

n k $k \geq 1$ $n(n-1)\cdots(n-k+1)/k!$ 1 $k=0$ 0 k

〈 〉

$$\boldsymbol{X} = \boldsymbol{U}\boldsymbol{D}\boldsymbol{V}',$$

$\boldsymbol{U}$ $\boldsymbol{V}$ $\boldsymbol{V}'$ $\boldsymbol{D}$
D_{ii} $\boldsymbol{D} = \boldsymbol{U}'\boldsymbol{X}\boldsymbol{V}$

(x, y)

$\pi/2$

$(-\infty, -1]$ $[1, \infty)$

$(-\infty, -1]$

$[1, \infty)$

$(-\infty i, -1i]$ $[1i, \infty i)$

$(-\infty i, -1i]$ $[1i, \infty i)$

$O(n^2)$

g

x y

μ $/m^2$

μ $/m^2$

CO_2

CO_2

$n = 16$

$1954 = 100$

$\geq$

8×8

3

3

$[0, 100]$

I_g

$[0, 100]$

$[0, 1]$

k

n

n

$n \equiv 1 \bmod 4$

$n \equiv 2 \bmod 4$

$[0, 1]$

≥ 1

$(start^{\gamma}, \ldots, end^{\gamma})^{(}1/\gamma)$

γ

(r, g, b) $[0, 1]$
$(r^\gamma, g^\gamma, b^\gamma)$

L_2

≥ 1

$= 1$

$\frac{1}{6}$

$\frac{2}{6}$ $\frac{3}{6}$ $\frac{4}{6}$ $\frac{5}{6}$

〈　　　　　　　　　　　　　　〉

〈 〉

$[0, M]$ M

$[0, M] \quad M =$

$\langle \qquad\qquad\qquad\qquad \rangle$
$\langle \qquad\qquad\qquad \rangle$

4×4

(x,y,z) (x,y,z,t)

χ^2 i, j $d_{ij} =$
$(f_{ij} - e_{ij})/\sqrt{e_{ij}}$ f_{ij} e_{ij}

d_{ij} $\sqrt{e_{ij}}$

$d_{ij} = 0$

$3\times$

〈 〉

$P(y|x)$

x

x

x

$\langle$ $\rangle$

y/x

k

k k

k

f_{ij}

$\sqrt{f_{ij}}$

k

k

10^{-7}

$n+1$

n

$\hat{f}(x_i)$

$\sum_i \hat{f}(x_i)(b_{i+1} - b_i) = 1$ b_i

n

N

N

$\{1, \ldots, N-1\}$

i

i

N

≥ 1

χ^2

χ^2

ij

$[0, 1]$

$[0, 1]$

10^j j

$k10^j$ $k \in \{1, 5\}$

$k10^j$ $k \in \{1, 2, 5\}$

$(nx-1)(ny-1)$

4×4

(x, y, z) (x, y, z, t)

$-1 \quad 1$

$(x1, y1)$ $(x2, y2)$ $x1 < x2$

y/x

y/x

〈 〉

$P(y|x)$ $P(x)$ x y

x x

$\langle$ $\rangle$

$[0, 1]$

〈 〉

$[0, 1]$

$10\log_{10}(N/m)$ N m

C_p

C_p

χ^2

C_p

$2p$ p

C_p $RSS/scale + 2p - n$ C_p

C_p

-2 $+$

kn_{par} n_{par} $k = 2$

$k = \log(n)$ n

C_p σ^2

σ^2

C_p

σ^2

F

$f((t-m)/s)/s$

$f(t-m)$ m s

s

$s \neq 1$

$s > 1$ $s < 1$

s

s

s s^2

s s^2

k

$10\log_{10}(N)$ N

$$x_t - \mu = a_1(x_{t-1} - \mu) + \cdots + a_p(x_{t-p} - \mu) + e_t$$

$10\log_{10}(N)$ N

$$x_t - \mu = a_0 + a_1(x_{t-1} - \mu) + \cdots + a_p(x_{t-p} - \mu) + e_t$$

a_0 μ

(p, d, q)

$$X_t = a_1 X_{t-1} + \cdots + a_p X_{t-p} + e_t + b_1 e_{t-1} + \ldots + b_q e_{t-q}$$

$X - m$ X

(p, d, q)

$$X_t = a_1 X_{t-1} + \cdots + a_p X_{t-p} + e_t + b_1 e_{t-1} + \ldots + b_q e_{t-q}$$

$X - m$ X

$0, \ldots, \max(p, q + 1)$

k

$P[X \leq x]$ $P[X > x]$

$= a$ $= b$

$$f(x) = \frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)} x^a (1-x)^b$$

$a > 0$ $b > 0$ $0 \leq x \leq 1$ $x = 0$ $x = 1$

$a/(a+b)$ $ab/((a+b)^2(a+b+1))$

$$B_x(a,b) = \int_0^x t^{a-1}(1-t)^{b-1}dt,$$

$I_x(a,b) = B_x(a,b)/B(a,b)$ $B(a,b) = B_1(a,b)$

$I_x(a,b)$

$X/(X+Y)$ $X \sim \chi^2_{2a}(\lambda)$ $Y \sim \chi^2_{2b}$

$P[X \leq x]$ $P[X > x]$

$= n$ $= p$

$$p(x) = \binom{n}{x} p^x (1-p)^{n-x}$$

$x = 0, \ldots, n$

$p(x)$

x $F(x) \geq p$ F

$n \times p_1$

$n \times p_2$

p_1

$P[X \leq x]$ $P[X > x]$

l s

$$f(x) = \frac{1}{\pi s} \left(1 + \left(\frac{x-l}{s}\right)^2\right)^{-1}$$

x

$|O - E|$

χ^2

$P[X \leq x]$ $P[X > x]$

$= n > 0$

$$f_n(x) = \frac{1}{2^{n/2}\Gamma(n/2)} x^{n/2-1} e^{-x/2}$$

$x > 0$ n $2n$

$= n$

$= \lambda$

$$f(x) = e^{-\lambda/2} \sum_{r=0}^{\infty} \frac{(\lambda/2)^r}{r!} f_{n+2r}(x)$$

$x \geq 0$ n n

λ

$E(X) = n + \lambda$ $Var(X) = 2(n + 2 * \lambda)$ $E((X - E(X))^3) = 8(n + 3 * \lambda)$

$= n$ $\lambda > 0$

$n = 0$

n

$\alpha = n/2$ $\sigma = 2$

$\{1, 2, \ldots, n-1\}$

$c*$

$n-1$

$c*$ $d_{ij} + c*$
d_{ij}

$n - 1$

(g_1, g_2) g_i $=$
$(\sum_{j=1}^{k} \lambda_j)/(\sum_{j=1}^{n} T_i(\lambda_j))$ λ_j
$T_1(v) = |v|$ $T_2(v) = max(v, 0)$

t

$$r_k = \sum_i x_{k-m+i} y_i$$

i $k = 1, \ldots, n + m - 1$

$n = m$ $i, k = 1, \ldots, n$

$x_j := x_{n+j}$ $j < 1$

$n - 1$

τ ρ

τ ρ

τ

$[-1, 1]$ 0

τ ρ

ρ

$1/n$

$(n-1)$

$$\sigma_K^2 = \int t^2 K(t)dt$$

$= 1$

$R(K) = \int K^2(t)dt$

$\sigma_K R(K)$

$R(K)$

$R(K)$

x y

x y

$\sum_i |x_i - y_i| / |x_i + y_i|$

p p p

$i < j <= n$

$n * (n-1)/2$

n^2

F_n i/n

i

$= (x_1, x_2 \quad x_n)$ F_n t

$$F_n(t) = \#\{x_i \leq t\}\, /n = \frac{1}{n}\sum_{i=1}^{n} \mathbf{1}_{[x_i \leq t]}.$$

$1/n$

$\langle$ $\rangle$

r

r

$P[X \leq x]$ $P[X > x]$

λ

$f(x) = \lambda e^{-\lambda x}$

$x \geq 0$

$H(t) = -\log(1 - F(t))$

$\equiv$

$$AIC = -2\log L + k \times \quad ,$$

L

$-2\log L$

RSS

$-2\log L$ $RSS/s - n$

C_p s $n\log(RSS/n)$

$n \log(RSS/n) - n + n \log 2\pi - \sum \log w$

w

$$x = \Lambda f + e$$

p x $p \times k$ k p

x

Φ

x

$$\Sigma = \Lambda' \Lambda + \Psi$$

Λ $G\Lambda$

G G

$[0, 1]$

f

f x

$\hat{f} = \Lambda' \Sigma^{-1} x$

f Λ

$d\mu/d\eta$

$P[X \leq x]$ $P[X > x]$

n_1 n_2

$$f(x) = \frac{\Gamma(n_1/2 + n_2/2)}{\Gamma(n_1/2)\Gamma(n_2/2)} \left(\frac{n_1}{n_2}\right)^{n_1/2} x^{n_1/2-1} \left(1 + \frac{n_1 x}{n_2}\right)^{-(n_1+n_2)/2}$$

$x > 0$

n_1 n_2

m t_m
t_m m

e

$$y_i = x_i + f_1 y_{i-1} + \cdots + f_p y_{i-p}$$

$$y_i = f_1 x_{i+o} + \cdots + f_p x_{i+o-(p-1)}$$

2×2

2×2

$>= 2$

2×2

2×2

2×2

2×2

2×2

2×2

$2^{31} - 1$

2×2

2×2

$2{\times}2$

2×2

2×2

$r * c$

$r \times c$

$\pm$

k

$$a(i) = \mathrm{qnorm}((1+i/(n+1))/2)$$

X^2

X^2

p $log(p)$

$P[X \leq x]$ $P[X > x]$

$= \alpha$ $= \sigma$

$$f(x) = \frac{1}{\sigma^{\alpha}\Gamma(\alpha)} x^{\alpha-1} e^{-x/\sigma}$$

$x > 0$ $\alpha > 0$ $\sigma > 0$ $\Gamma(\alpha)$

$$E(X) = \alpha\sigma \qquad Var(X) = \alpha\sigma^2$$

$H(t) = -\log(1 - F(t))$

$$P(a, x) = \frac{1}{\Gamma(a)} \int_0^x t^{a-1} e^{-t} dt$$

$P(a, x)$

$P[X \leq x]$ $P[X > x]$

$= p$

$p(x) = p(1-p)^x$

$x = 0, 1, 2, \ldots$ $0 < p \leq 1$

x $F(x) \geq p$ F

ϵ $|dev -$

$dev_{old}|/(|dev| + 0.1) < \epsilon$

n

n $n-1$
$2^{(n-1)}$

$n-1$ i i
j $-j$
j
j

$n - 1$

$alpha$

$beta$

$gamma$

$s_1[0]...s_p[0]$

$$\hat{Y}[t+h] = a[t] + hb[t] + s[t + 1 + (h-1) \bmod p],$$

$a[t]$ $b[t]$ $s[t]$

$$a[t] = \alpha(Y[t] - s[t-p]) + (1-\alpha)(a[t-1] + b[t-1])$$

$$b[t] = \beta(a[t] - a[t-1]) + (1-\beta)b[t-1]$$

$$s[t] = \gamma(Y[t] - a[t]) + (1-\gamma)s[t-p]$$

$$\hat{Y}[t+h] = (a[t] + hb[t]) \times s[t + 1 + (h-1) \bmod p].$$

$a[t]$ $b[t]$ $s[t]$

$$a[t] = \alpha(Y[t]/s[t-p]) + (1-\alpha)(a[t-1] + b[t-1])$$

$$b[t] = \beta(a[t] - a[t-1]) + (1-\beta)b[t-1]$$

$$s[t] = \gamma(Y[t]/a[t]) + (1-\gamma)s[t-p]$$

α β γ

$\langle$ $\rangle$

$P[X \leq x]$ $P[X > x]$

Np $N - Np$ n

$$p(x) = \binom{m}{x}\binom{n}{k-x} \Big/ \binom{m+n}{k}$$

$x = 0, \ldots, k$

H_{ii}

X

F

$N(m, 1)$ X

$m(x)$

$m'(x)$

$m(x)$

≥ 0

$e \sim \mathcal{N}(0, \kappa Q)$ $(eta \equiv \eta), \eta \sim$
$\mathcal{N}(0, \kappa h)$ κ

$t - 1$

κ

k k

k

k

±

$O(n^2p)$

n

$O(n^2p)$

α

x

x x

α

$\alpha < 1$ α

$(1 - (\text{dist}/\text{maxdist})^3)^3$ $\alpha > 1$

$\alpha^{1/p}$ p

$P[X \leq x]$ $P[X > x]$

$= \mu$ $= \sigma$

$$F(x) = \frac{1}{1 + e^{-(x-\mu)/\sigma}}$$

$$f(x) = \frac{1}{\sigma} \frac{e^{(x-\mu)/\sigma}}{(1 + e^{(x-\mu)/\sigma})^2}$$

μ $\pi^2/3\sigma^2$

$logit(p) \; = \; \log(p/(1-p))$

$P[X \le x]$ $P[X > x]$

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma x} e^{-(\log(x)-\mu)^2/2\sigma^2}$$

μ σ $E(X) = exp(\mu + 1/2\sigma^2)$ $Var(X) = exp(2\mu + \sigma^2)(exp(\sigma^2) - 1)$ $\sqrt{exp(\sigma^2) - 1}$ σ $\sigma < 1/2$

$$H(t) = -\log(1 - F(t))$$

σ

h_{ii} H

β

$$\boldsymbol{Y} = \boldsymbol{X}\boldsymbol{\beta} + \boldsymbol{\epsilon}$$

β

$1/\Phi^{-1}(\frac{3}{4})$

$$E[mad(X_1, \ldots, X_n)] = \sigma$$

X_i $N(\mu, \sigma^2)$ n

$\mu =$

$\Sigma =$

$$D^2 = (x - \mu)' \Sigma^{-1} (x - \mu)$$

p

p

$p \times p$

$d\mu/d\eta$

λ $= \mu^{\lambda}$

$d\mu/d\eta$

K

K

K

K

K

1

K

K

K

K

K

$f(x-l)$ $f((x-l)/s)/s$

l s

$s = 1$

K

N K

K K

K

$$P(X_1 = x_1, \ldots, X_K = x_k) = C \times \prod_{j=1}^{K} \pi_j^{x_j}$$

C $C = N!/(x_1! \cdots x_K!)$ $N = \sum_{j=1}^{K} x_j$

X_j $j =$

$1, \ldots, K$

$Bin(n_j, P_j)$ $n_1 = N$

$P_1 = \pi_1$ π $j \geq 2$ $n_j = N - \sum_{k=1}^{j-1} n_k$

$P_j = \pi_j / (1 - \sum_{k=1}^{j-1} \pi_k)$

$P[X \leq x]$ $P[X > x]$

$= n$ $= p$

$$p(x) = \frac{\Gamma(x+n)}{\Gamma(n)x!} p^n (1-p)^x$$

$x = 0, 1, 2, \ldots$ $n > 0$ $0 < p \leq 1$

Γ

$n(1-p)/p^2$

x $F(x) \geq p$ F

$$y = f(x, \theta) + \epsilon$$

$$y = f(x, \theta)$$

$P[X \leq x]$ $P[X > x]$

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-(x-\mu)^2/2\sigma^2}$$

μ σ

R^d

$\epsilon|x_0| \ + \ (tol/3)$

ϵ x_0

$\epsilon\,|x| + (tol/3)$ x_0

$\epsilon|x_0| + tol$

$x_1 = a+(1-\phi)(b-a)$

$\phi = (\sqrt{5}-1)/2 = 0.61803..$

$x_2 = a + \phi(b-a)$ $[x_1, x_2]$

k $k-1$

$y = 0$

〈 〉

$\sqrt{|residuals|}$

$\sqrt{|E|}$ $|E|$

E

$R_i/(s \times \sqrt{1 - h_{ii}})$ h_{ii}

〈 〉

$P[X \leq x]$ $P[X > x]$

$$p(x) = \frac{\lambda^x e^{-\lambda}}{x!}$$

$x = 0, 1, 2, \ldots$ $E(X) = Var(X) = \lambda$

$p(x)$

x $P(X \leq x) <$

q

$$\eta = \mu^{\lambda}$$

p

p

$(0, 1)$

$0 < a < 1$ $(0, 1)$

$[0, 1]$

〈 〉

σ^2

$[-1, 1]$

$[0, 1]$

$[0, 1]$

i

$$Q_i(p) = (1 - \gamma)x_j + \gamma x_{j+1}$$

$1 \leq i \leq 9$ $\frac{j-m}{n} \leq p < \frac{j-m+1}{n}$ x_j j n
m γ
$g = np + m - j$

k $p(k)$

$$p(k) = \frac{k - \alpha}{n - \alpha - \beta + 1}$$

α β $m = \alpha + p\,(1 - \alpha - \beta)$ $\gamma = g$

$p(k) = \frac{k}{n}$

$p(k) = \frac{k-0.5}{n}$

$p(k) = \frac{k}{n+1}$ $\quad p(k) = \quad [F(x_k)]$

$p(k) = \frac{k-1}{n-1}$ $\quad p(k) = \quad [F(x_k)]$

$p(k) = \frac{k-\frac{1}{3}}{n+\frac{1}{3}}$ $\quad p(k) \approx \quad [F(x_k)]$

$p(k) = \frac{k-\frac{3}{8}}{n+\frac{1}{4}}$

$f(w_j)$ f w_j
j

〈 〉

k_2 k_2
$j \in \{1, \ldots, k_2; n -$
$k_2 + 1, \ldots, n\}$

$O(n \log k)$

$O(n \times k)$ k n

$\langle$ $\rangle$

W

W

W

$P[X \leq x]$ $P[X > x]$

0

$n(n+1)/2$ $n(n+1)/4$ $n(n+1)(2n+1)/24$

$S(y)$

$S(y) + S(y - S(y))$

$(0, 1]$ λ

n $n > 49$

$[low, high]$

λ $s = spar$ $\lambda = r * 256^{3s-1}$ $r =$
$tr(X'WX)/tr(\Sigma)$ Σ $\Sigma_{ij} = \int B_i''(t)B_j''(t)dt$ X $X_{ij} = B_j(x_i)$
W n
$B_k(.)$ k

$f_i = f(x_i)$ $f = Xc$ c
$L = (y-f)'W(y-f) + \lambda c'\Sigma c$
c $(X'WX + \lambda\Sigma)c = X'Wy$

λ $s = s0 + 0.0601 * \mathbf{log}\,\lambda$

λ $\log\lambda$

$(x_i, y_i, w_i), i = 1, \ldots, n$

λ

$O(n^{0.2})$

n $n > 49$

$O(n_k) + O(n)$ n_k

$(-\pi, \pi]$

2π $(-0.5, 0.5]$

$(-\pi, \pi]$

$i + (j - 1) * (j - 2)/2$

i j

$i < j$

C_p

$(x_1, \ldots, x_n)$ $(y_0, y_1, \ldots, y_n)$
$fn(t) = c_i$ $t \in (x_i, x_{i+1})$
$fn(x_i) = y_i$
$fn(x_i) = y_{i-1}$ $i = 1, \ldots, n$
c_i

c_i y $c_i = (1 - f)y_i + f \cdot y_{i+1}$

〈 〉

μ_t

$$\mu_{t+1} = \mu_t + \xi_t, \qquad \xi_t \sim N(0, \sigma_\xi^2)$$

$$x_t = \mu_t + \epsilon_t, \qquad \epsilon_t \sim N(0, \sigma_\epsilon^2)$$

σ_ξ^2 σ_ϵ^2

μ_t

$$\mu_{t+1} = \mu_t + \nu_t + \xi_t, \qquad \xi_t \sim N(0, \sigma_\xi^2)$$

$$\nu_{t+1} = \nu_t + \zeta_t, \qquad \zeta_t \sim N(0, \sigma_\zeta^2)$$

$\sigma_\zeta^2 = 0$

$\sigma_\xi^2 = 0$

$$x_t = \mu_t + \gamma_t + \epsilon_t, \qquad \epsilon_t \sim N(0, \sigma_\epsilon^2)$$

γ_t

$$\gamma_{t+1} = -\gamma_t + \cdots + \gamma_{t-s+2} + \omega_t, \qquad \omega_t \sim N(0, \sigma_\omega^2)$$

$\sigma_\omega^2 = 0$

t

σ_ϵ^2

$p \times 4$

$$\hat{\sigma}^2 = \frac{1}{n-p} \sum_i w_i R_i^2,$$

R_i i

$(p, n-p, p*)$

R^2

$$R^2 = 1 - \frac{\sum_i R_i^2}{\sum_i (y_i - y^*)^2},$$

y^* y_i

R^2 p

$p \times p$ $\hat{\beta}_j$ $j = 1, \ldots, p$

$p \times 4$

$$\hat{\sigma}^2 = \frac{1}{n-p} \sum_i R_i^2,$$

R_i i

$(p, n-p)$ n

$p \times p$

$= c_j$

$= s_j$

$(c_j, c_{j+1}]$

$c_1 s_1 c_2 s_2 \ldots s_n c_{n+1}$

c_j s_j

$\langle$ $\rangle$

> 0

δ

$P[X \leq x]$ $P[X > x]$

t $= \nu$

$$f(x) = \frac{\Gamma((\nu+1)/2)}{\sqrt{\pi\nu}\,\Gamma(\nu/2)}(1 + x^2/\nu)^{-(\nu+1)/2}$$

x 0 $\nu > 1$ $\frac{\nu}{\nu-2}$ $\nu > 2$

t (ν, δ)

$T_\nu(\delta) := \frac{U+\delta}{\chi_\nu/\sqrt{\nu}}$ U χ_ν $U \sim \mathcal{N}(0,1)$ χ^2_ν

t

$T = \frac{\bar{X}-\mu_0}{S/\sqrt{n}}$ $\bar{X}$ S $X_1, X_2, \ldots, X_n$

$N(\mu, \sigma^2)$ T t $= n - 1$

$= (\mu - \mu_0)\sqrt{n}/\sigma$

$x \neq 0$

t

R/s R

n s^2 df

s

$P[X \leq x]$ $P[X > x]$

$n_g =$ R n_g

$P[X \leq x]$ $P[X > x]$

$$f(x) = \frac{1}{max - min}$$

$min \leq x \leq max$

$u := min == max$ $X \equiv u$

p $k < p$

$P[X \leq x]$ $P[X > x]$

a σ

$$f(x) = (a/\sigma)(x/\sigma)^{a-1} \exp(-(x/\sigma)^a)$$

$x > 0$ $F(x) = 1 - \exp(-(x/\sigma)^a)$
$E(X) = \sigma\Gamma(1 + 1/a)$ $Var(X) = \sigma^2(\Gamma(1 + 2/a) - (\Gamma(1 + 1/a))^2)$

$$H(t) \quad = \quad -\log(1 \; - \; F(t))$$
$$H(t) = (t/b)^a$$

R_i

$\sqrt{w_i}$ w_i

n' n'

F $(u+v)/2$

u v F F

$m(m+1)/2$ m

$P[X \leq x]$ $P[X > x]$

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-1

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