Equations of the distributions

Year 2019

Equations of the probability density functions are given below in alphabetical order.

1 Beta

The probability density function of the beta distribution is:

$$f(y, \alpha, \beta) = \frac{1}{k \cdot B(\alpha, \beta)} y^{\alpha-1}(1-y)^{\beta-1} \tag{1}$$

where $y = (x - \mu)/k$, μ is the location, k is the scale, α and β are the shape parameters, $\alpha > 0, \beta > 0$, and $B(\alpha, \beta)$ is defined with the gamma function Γ:

$$B(\alpha, \beta) = \frac{\Gamma(\alpha)\Gamma(\beta)}{\Gamma(\alpha + \beta)} \tag{2}$$

2 Exponential

The probability density function of the exponential distribution is:

$$f(y) = \frac{1}{k} \exp(-y) \tag{3}$$

where $y = (x - \mu)/k$, μ is the location, and k is the scale, $k > 0$.

3 Johnson SB

The probability density function of the Johnson SB distribution is:

$$f(y, \alpha, \beta) = \frac{\beta}{k \cdot y(1-y)} \phi\left(\alpha + \beta \log \frac{y}{1-y}\right) \tag{4}$$

where $y = (x - \mu)/k$, μ is the location, k is the scale, α and β are the shape parameters, $\alpha > 0, \beta > 0$, and ϕ is the probability density function of the standard normal distribution:

$$\phi(x) = \frac{1}{\sqrt{2\pi}} \exp(-x^2/2) \tag{5}$$

4 Skew-normal

The probability density function of the skew-normal distribution is:

$$f(y, \alpha) = \frac{2}{k} \cdot \phi(y) \cdot \Phi(\alpha \cdot y) \tag{6}$$

where $y = (x - \mu)/k$, μ is the location, k is the scale, α is the skewness parameter, ϕ is the probability density function of the standard normal distribution (Eq. 5) and Φ is the cumulative distribution function of the normal distribution:

$$\Phi(x) = \int_{-\infty}^{x} \phi(u) du \tag{7}$$

5 Uniform

The probability density function of the uniform distribution is:

$$f(x) = \frac{1}{b - a} \tag{8}$$

where a and b are the minimum and maximum values of the support, $x \in [a, b]$.