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The Gamma Distribution

The probability density function for a gamma distribution is the following:

$$f(y) = \frac{\left(\frac{y-\mu}{\beta}\right)^{\alpha-1} \exp\left(-\frac{y-\mu}{\beta}\right)}{\beta\Gamma(\alpha)}, \quad y \geq \mu; \quad \alpha, \beta > 0$$

where α is the shape parameter, μ is the location parameter, β is the scale parameter, and Γ is the gamma function:

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

The case where μ=0 and β=1 is called standardized gamma distribution. The equation for the standard gamma distribution reduces to:

$$f(y) = \frac{y^{\alpha-1} e^{-y}}{\Gamma(\alpha)}$$

It can be shown that for the gamma distribution, the variance is proportional to the square of the mean. This information can be used to model positive continuous variables that exhibit this relationship between the variances and the means.

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