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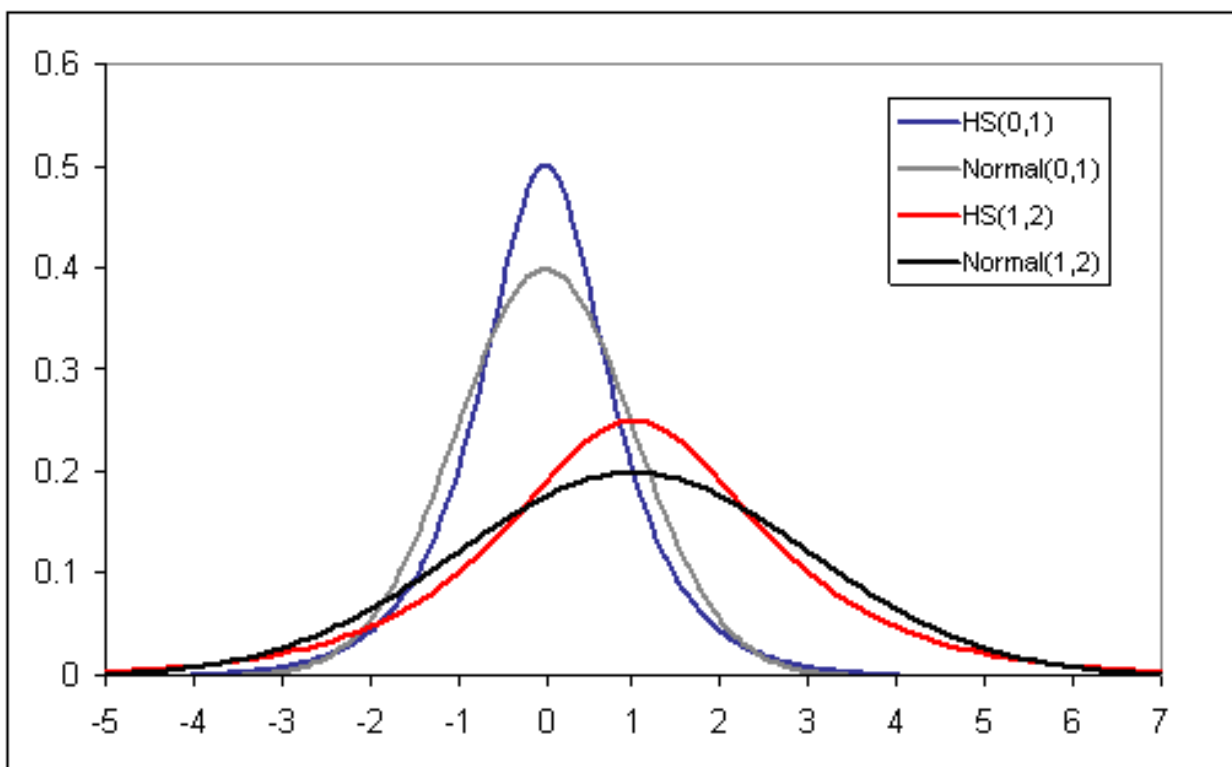
Hyperbolic-Secant distribution

Format: HS(m, s)

The Hyperbolic-Secant distribution is a symmetric distribution similar to the Normal distribution and defined by its mean and standard deviation, but with a kurtosis (Kurtosis(K).php) of 5, so it is more peaked than the Normal. Examples of the Hyperbolic-Secant distribution are given below, together with Normal distributions with the same mean and standard deviation:

Uses

The Hyperbolic-Secant distribution can be used to fit data that seem to be approximately Normal but with a distribution that is showing narrower shoulders, just as the Generalised Error (Errordistribution.php) and Student (Student-tdistribution.php)

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distributions are an option for data with wider shoulders than a Normal.

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Comments

The Hyperbolic-Secant distribution gets its (rather awful) name from the sech function in its [probability density function (Hyperbolic-Secantequations.php)](Hyperbolic-Secantequations.php).

[ModelRisk (http://www.vosesoftware.com/products/modelrisk/)](http://www.vosesoftware.com/products/modelrisk/) functions added to Microsoft Excel for the Hyperbolic Secant (HS) distribution

[VoseHS (DistributionsinModelRisk.php)](DistributionsinModelRisk.php) generates random values from this distribution for **[Monte Carlo simulation (MonteCarloSimulationintroduction.php)](MonteCarloSimulationintroduction.php)**, or calculates a percentile if used with a [U parameter (DistributionfunctionsandtheUparameter.php)](DistributionfunctionsandtheUparameter.php).

[VoseHSObject (Modelingwithobjects.php)](Modelingwithobjects.php) constructs a distribution object for this distribution.

[VoseHSProb (Probabilitycalculationfunctions.php)](Probabilitycalculationfunctions.php) returns the probability density or cumulative distribution function for this distribution.

[VoseHSProb10 (Probabilitycalculationfunctions.php)](Probabilitycalculationfunctions.php) returns the log10 of the probability density or cumulative distribution function.

[VoseHSFit (FittinginModelRisk.php)](FittinginModelRisk.php) generates values from this distribution fitted to data, or calculates a percentile from the fitted distribution.

[VoseHSFitObject (FittinginModelRisk.php)](FittinginModelRisk.php) constructs a distribution object of this distribution fitted to data.

[VoseHSFitP (FittinginModelRisk.php)](FittinginModelRisk.php) returns the parameters of this distribution fitted to data.

Hyperbolic-Secant distribution equations

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Probability density function :	$f(x) = \dfrac{\text{sech}(y)}{2\sigma}$ where $y = \dfrac{\pi}{2\sigma}(x - \mu)$
Cumulative distribution function :	$F(x) = \dfrac{2}{\pi} \tan^{-1}\left[\exp(y)\right]$
Parameter restriction :	$\sigma > 0$
Domain :	$-\infty < x < +\infty$
Mean :	μ
Mode :	μ
Variance :	σ^2
Skewness :	0
Kurtosis :	5

ModelRisk

Monte Carlo simulation in Excel. Learn more

(http://www.vosesoftware.com/product/modelrisk)

(http://www.vosesoftware.com/products/modelrisk)

Tamara

Adding risk and uncertainty to your project schedule. Learn more

(http://www.vosesoftware.com/products/tamara)

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Pick a schedule from MS Project or Primavera

(http://www.vosesoftware.com/products/tamara)

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(https://youtu.be/S4XSNIRrHqg)

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