Skewness

The degree of asymmetry of a distribution. If the distribution has a longer tail less than the maximum, the function has Negative skewness. Otherwise, it has Positive skewness. Several types of skewness are defined. The Fisher Skewness is defined by

$$\gamma_1 = \frac{\mu_3}{\mu_2{}^{3/2}} = \frac{\mu_3}{\sigma^3}, \tag{1}$$

where μ_3 is the third Moment, and $\mu_2{}^{1/2} \equiv \sigma$ is the Standard Deviation. The Pearson Skewness is defined by

$$\beta_1 = \left(\frac{\mu_3}{\sigma^3}\right)^2 = \gamma_1{}^2. \tag{2}$$

The Momental Skewness is defined by

$$\alpha^{(m)} \equiv \tfrac{1}{2}\gamma_1. \tag{3}$$

The Pearson Mode Skewness is defined by

$$\frac{[\text{mean}] - [\text{mode}]}{\sigma}. \tag{4}$$

Pearson's Skewness Coefficients are defined by

$$\frac{3[\text{mean}] - [\text{mode}]}{s} \tag{5}$$

and

$$\frac{3[\text{mean}] - [\text{median}]}{s}. \quad (6)$$

The Bowley Skewness (also known as Quartile Skewness Coefficient) is defined by

$$\frac{(Q_3 - Q_2) - (Q_2 - Q_1)}{Q_3 - Q_1} = \frac{Q_1 - 2Q_2 + Q_3}{Q_3 - Q_1}, \quad (7)$$

where the Qs denote the Interquartile Ranges. The Momental Skewness is

$$\alpha^{(m)} \equiv \tfrac{1}{2}\gamma = \frac{\mu_3}{2\sigma^3}. \quad (8)$$

An Estimator for the Fisher Skewness γ_1 is

$$g_1 = \frac{k_3}{{k_2}^{3/2}}, \quad (9)$$

where the ks are *k*-Statistic. The Standard Deviation of g_1 is

$$\sigma_{g_1}{}^2 \approx \frac{6}{N}. \quad (10)$$

See also Bowley Skewness, Fisher Skewness, Gamma Statistic, Kurtosis, Mean, Momental Skewness, Pearson Skewness, Standard Deviation

References

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