

estimator ($\hat{\theta}$)

A function that is used to infer (\rightarrow *inference*) an estimate of an unknown parameter of a statistical *model*, like the *mean* of a *population* or the *data generating function* of a *data set* or *probability distribution*. The estimator $\hat{\theta}$ estimates the unknown parameter θ . When θ is a *random variable* the estimator itself is a function $\hat{\theta}(X)$ on that random variable, and the estimate for a specific value $X = x$ is denoted by $\hat{\theta}(x)$. Sometimes $\hat{\theta}$ itself is treated as a random variable. The *error* of the estimator is $\hat{\theta}(x) - \theta$.

A “hat” is typically used to indicate an estimator. For example, the estimator of the population mean is equal to the sample mean:

$$\hat{\mu} = \bar{x} = \frac{1}{n-1} \sum_{i=1}^n x_i$$

The parameter θ would in this case be the true population mean, μ .