

STATISTICAL averages (for a stationary random process)	TEMPORAL averages
<p>Average value</p> $\bar{x} = \int_{-\infty}^{\infty} x \cdot w(x) dx$	<p>Average value</p> <p>Continuous: $\overline{x(t)} = \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^T x(t) dt$</p> <p>Discrete: $\overline{x[t]} = \lim_{N \rightarrow \infty} \frac{1}{2N+1} \sum_{t=-N}^N x[t]$</p> <p>Discrete & finite: $\overline{x[t]} = \frac{1}{\text{how many}} \sum_{\text{all}} x[t]$</p>
<p>Average squared value</p> $\overline{x^2} = \int_{-\infty}^{\infty} x^2 \cdot w(x) dx$	<p>Average squared value</p> <p>Continuous: $\overline{x^2(t)} = \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^T x^2(t) dt$</p> <p>Discrete: $\overline{x^2[t]} = \lim_{N \rightarrow \infty} \frac{1}{2N+1} \sum_{t=-N}^N x^2[t]$</p> <p>Discrete & finite: $\overline{x^2[t]} = \frac{1}{\text{how many}} \sum_{\text{all}} x^2[t]$</p>
<p>Variance</p> $\sigma^2 = \int_{-\infty}^{\infty} (x - \bar{x})^2 \cdot w(x) dx$	<p>Variance</p> <p>Continuous: $\overline{\sigma^2} = \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^T (x(t) - \mu)^2 dt$</p> <p>Discrete: $\overline{x^2[t]} = \lim_{N \rightarrow \infty} \frac{1}{2N+1} \sum_{t=-N}^N (x[t] - \mu)^2$</p> <p>Discrete & finite:</p> $\overline{x^2[t]} = \frac{1}{\text{how many}} \sum_{\text{all}} (x[t] - \mu)^2$
<p>Autocorrelation function</p> $R_{ff}(\tau) = \overline{f(t) \cdot f(t+\tau)} = \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} x_1 x_2 \cdot w(x_1, x_2; \tau) dx_1 dx_2$	<p>Autocorrelation function</p> <p>Continuous:</p> $R_{xx}(\tau) = \overline{x(t) \cdot x(t+\tau)} = \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^T x(t) \cdot x(t+\tau) dt$ <p>Discrete:</p> $R_{xx}[\tau] = \overline{x[t] \cdot x[t+\tau]} = \lim_{N \rightarrow \infty} \frac{1}{2N+1} \sum_{t=-N}^N x[t] \cdot x[t+\tau]$ <p>Discrete & finite:</p> $R_{xx}[\tau] = \overline{x[t] \cdot x[t+\tau]} = \frac{1}{\text{how many}} \sum_{t=\text{all}} x[t] \cdot x[t+\tau]$

Cross-correlation function

$$R_{fg}(\tau) = \overline{f(t) \cdot g(t+\tau)} =$$

$$= \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} x_1 y_2 \cdot w(x_1, y_2; \tau) dx_1 dy_2$$

Cross-correlation function

Continuous:

$$R_{xy}(\tau) = \overline{x(t) \cdot y(t+\tau)} =$$

$$= \lim_{T \rightarrow \infty} \frac{1}{2T} \int_{-T}^T x(t) \cdot y(t+\tau) dt$$

Discrete:

$$R_{xy}[\tau] = \overline{x[t] \cdot y[t+\tau]} =$$

$$= \lim_{N \rightarrow \infty} \frac{1}{2N+1} \sum_{t=-N}^N x[t] \cdot y[t+\tau]$$

Discrete & finite:

$$R_{xy}[\tau] = \overline{x[t] \cdot y[t+\tau]} =$$

$$= \frac{1}{\text{how many}} \sum_{t=\text{all}} x[t] \cdot y[t+\tau]$$