

Errata list to Stationary stochastic processes for scientists and engineers

August 24, 2015

Below is a list of clarifications/corrections/typos found so far:

- page xv, line 5⁻: GARSH should be GARCH.
- page xv, line 3⁻: Wiener should be Wiener.
- page 25, line 12⁻: The second line in the formula for $r(t, t)$ is quite correct, but a more logical way to order the four terms is

$$= V[U_t] + 0.5 \cdot C[U_t, U_{t-1}] + 0.5 \cdot C[U_{t-1}, U_t] + 0.5^2 \cdot V[U_{t-1}]$$

- page 34, line 5⁺: Should be $c. r(-\tau) = r(\tau)$,
- page 36, line 8⁺: $\phi = 0$. should be $\phi = \pi/2$.
- page 44, line 1⁺ in the text and line 2⁺ in the figure caption: $X_{t+1} = 0.9X_t + e_t$ should be $X_{t+1} = 0.9X_t + e_{t+1}$
- page 44, line 1⁻ in the text: $X_{t+1} = -0.9X_t + e_t$ should be $X_{t+1} = -0.9X_t + e_{t+1}$
- page 48, line 9 – 10⁺: Should be
“However, if the process is strictly stationary, all the variables have the same distribution and hence also the same expectation.”
- page 51, line 5⁺: Last summation, $\sum_{k=1}^{n+t}$ should be $\sum_{k=1}^{n-t}$
- page 57, line 7⁺: Step 1 in the simulation from covariance function works both for stationary and for non-stationary Gaussian processes; e.g.

$$\Sigma(n) = \begin{pmatrix} r(1,1) & r(1,2) & \dots & r(1,n) \\ r(2,1) & r(2,2) & \dots & r(2,n) \\ \vdots & \vdots & \ddots & \vdots \\ r(n,1) & r(n,2) & \dots & r(n,n) \end{pmatrix}$$

- page 66, line 8⁻: $d[\widehat{\lambda}_T]$ should be $d[\widehat{\lambda}_T]$ (two occasions)
- page 67, line 1⁺: Should read
“ t if and only if no event occurs in the interval $[0, t]$. We conclude, from the”
- page 76, line 3⁺ in Definition 3.4: Should read
“real plane, such that the number of points in disjoint regions are statistically ...”

- page 86, line 3⁺ in figure caption: “covariance function $r(\tau)$ ” should be “spectral densities $R(f)$ ”.
- page 111, line 7⁻: Last sentence should read
“It will be studied in more detail in Section 8.3.”
- page 116, line 6⁺: Should read “By re-arranging (5.1), we get the process into its standard form,”
- page 116, Equation (5.5), $\cos 2\pi f\tau$, should be $\cos 2\pi f t$,
- page 132, line 1⁺: Delete the word “stock”.
- page 137, in Definition 6.1, line 1⁻: Delete the du in the sums that define $Y(t)$.
- page 137, line 3⁻: In the second integral the derivative of $X(t - u)$ should be written $\frac{d}{du}X(t - u)$, not $\frac{d}{dt}X(t - u)$.
- page 157, line 3 – 4⁺: The covariance symbol should be C , not C .
- page 162, first line after Figure 6.5: In probability statement, use a round parenthesis: $P(Y(t) \leq 4)$.
- page 195, line 15⁺: Replace “independent” by “uncorrelated” at two places.
- page 203, line 4 – 5⁺: Delete one of the “only”.
- page 204, line 9⁺: “show to be ...” should be “shown to be ...”
- page 208, Definition 8.2: Should start “The envelope of a stationary process ...”
- page 217, line 4⁺ and 5⁻: Schwarz’
- page 233, Example 8.11: Should be
The Ornstein-Uhlenbeck process,

$$X'(t) + \alpha X(t) = \sigma_0 W'(t),$$

can be simulated in its integrated form, dividing by Δ_t ,

$$\begin{aligned} \frac{X(t) - X(t - \Delta_t)}{\Delta_t} &= -\frac{\alpha}{\Delta_t} \int_{t-\Delta_t}^t X(u) du + \sigma_0 \frac{W(t) - W(t - \Delta_t)}{\Delta_t} \\ &\approx -\alpha X(t) + \frac{\sigma_0}{\sqrt{\Delta_t}} N_t, \end{aligned}$$

where N_t is a standardized normal variable, $N_t \in N(0, 1)$. The Euler scheme then gives

$$X^{(a)}(t + \Delta_t) = (1 - \alpha\Delta_t)X^{(a)}(t) + \sigma_0\sqrt{\Delta_t}N_t. \quad (1)$$

The exact solution is given by (8.14) and (8.15),

$$X^{(e)}(t + \Delta_t) = X^{(e)}(t)e^{-\alpha\Delta_t} + \sigma_0\sqrt{\frac{1 - e^{-2\alpha\Delta_t}}{2\alpha}}N_t. \quad (2)$$

- page 240, Equations (9.7) (last summation), (9.8) and (9.9): $r_x(\tau)$ should be $r_X(\tau)$ in all three cases
- page 250, line 2⁻: “... the pairwise covariance is”
- page 254, line 9⁻: Welsh should be Welch
- page 264, line 6⁺: Should read
“combinations of multivariable normal variables also have a normal distribution.”