Abstract

Example in the folder: Linear_M

$$d\mathbf{x} = (\begin{bmatrix} -5 & 1 \\ 2 & -6 \end{bmatrix}\mathbf{x} + \begin{bmatrix} 1 \\ 2 \end{bmatrix})dt + (\begin{bmatrix} -0.25 & 0 \\ 0.25 & 0 \end{bmatrix}\mathbf{x} + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix})d\mathbf{w}_1 + (\begin{bmatrix} 0 & 0.5 \\ 0 & -0.75 \end{bmatrix}\mathbf{x} + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix})d\mathbf{w}_2$$

$$z_{t_k} = \mathbf{x}_1(t_k) + \mathbf{x}_1(t_k)\xi_{t_k} + e_{t_k},$$

Example in the folder: Linear_M_Add

$$d\mathbf{x} = (\begin{bmatrix} -5 & 1 \\ 2 & -6 \end{bmatrix}\mathbf{x} + \begin{bmatrix} 1 \\ 2 \end{bmatrix})dt + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix}d\mathbf{w}_1 + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix}d\mathbf{w}_2$$

$$z_{t_k} = \mathbf{x}_1(t_k) + \mathbf{x}_1(t_k)\xi_{t_k} + e_{t_k},$$

Example in the folder: Linear_M_NoAuto

$$\begin{aligned} d\mathbf{x} = &(\begin{bmatrix} -5 & 1 \\ 2 & -6 \end{bmatrix}\mathbf{x} + \begin{bmatrix} -2 \\ 1 \end{bmatrix}t + \begin{bmatrix} 1 \\ 2 \end{bmatrix})dt \\ &+(\begin{bmatrix} -0.25 & 0 \\ 0.25 & 0 \end{bmatrix}\mathbf{x} + \begin{bmatrix} 0.25 \\ -0.25 \end{bmatrix}t + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix})d\mathbf{w}_1 \\ &+(\begin{bmatrix} 0 & 0.5 \\ 0 & -0.75 \end{bmatrix}\mathbf{x} + \begin{bmatrix} -0.25 \\ 0.25 \end{bmatrix}t + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix})d\mathbf{w}_2 \end{aligned}$$

$$z_{t_k} = \mathbf{x}_1(t_k) + \mathbf{x}_1(t_k)\xi_{t_k} + e_{t_k},$$

Example in the folder: Linear_M_NoAuto_Add

$$d\mathbf{x} = (\begin{bmatrix} -5 & 1 \\ 2 & -6 \end{bmatrix}\mathbf{x} + \begin{bmatrix} -2 \\ 1 \end{bmatrix}t + \begin{bmatrix} 1 \\ 2 \end{bmatrix})dt + (\begin{bmatrix} 0.25 \\ -0.25 \end{bmatrix}t + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix})d\mathbf{w}_1 + (\begin{bmatrix} -0.25 \\ 0.25 \end{bmatrix}t + \begin{bmatrix} 0.5 \\ 0.25 \end{bmatrix})d\mathbf{w}_2$$

$$z_{t_k} = \mathbf{x}_1(t_k) + \mathbf{x}_1(t_k)\xi_{t_k} + e_{t_k},$$

Example in the folder: Cox_M

$$\begin{aligned} d\mathbf{x}_1 &= (\alpha + \theta\mathbf{x}_1)dt + \rho\sqrt{\mathbf{x}_1}d\mathbf{w}_1 \\ d\mathbf{x}_2 &= \beta\mathbf{x}_2^2 dt + \gamma\mathbf{x}_1^2 d\mathbf{w}_2 \end{aligned}$$

$$z_{t_k} = \mathbf{x}_2(t_k) - 0.001\mathbf{x}_2^3(t_k) + (\mathbf{x}_2(t_k) - 0.01\mathbf{x}_2^2(t_k))\xi_{t_k} + e_{t_k},$$

where $\alpha = 0.0025$, $\theta = -0.0175$, $\rho = 0.1$, $\beta = -0.01$, $\gamma = 0.05$.

In all the examples $\{\xi_{t_k} : \xi_{t_k} \sim \mathcal{N}(0, \lambda^2)\}$ and $\{e_{t_k} : e_{t_k} \sim \mathcal{N}(0, \sigma^2)\}$ are sequences of random vectors i.i.d; and $\mathcal{E}(\xi_{t_k} e_{t_k}) = 0$ for all k.