Time Series Analysis

Week 8 – Multivariate time series

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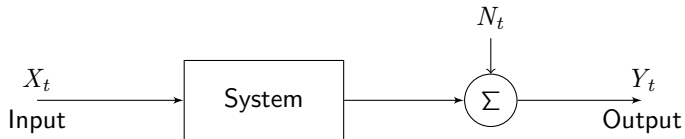
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Week 8: Outline of the lecture

▶ Chapter 9 – Multivariate time series
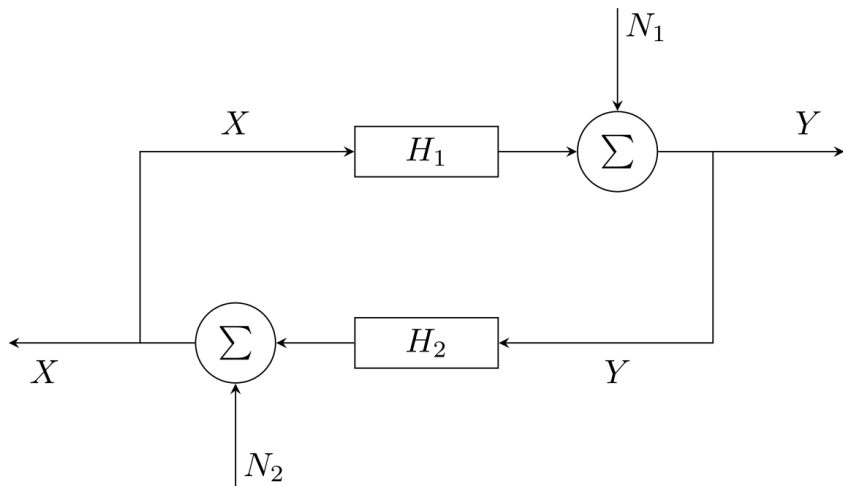
Multiple output models

Re-consider the univariate transfer function model:

$$Y_t = h(B)X_t + N_t$$

▶ What if there is a feedback from Y to X?

Closed Loop Models

$$Y_t = h_1(B)X_t + N_{1,t}$$
$$X_t = h_2(B)Y_t + N_{2,t}$$

Closed Loop Models

$$Y_t = h_1(B)X_t + N_{1,t}$$
$$X_t = h_2(B)Y_t + N_{2,t}$$

Or:

$$\begin{pmatrix} 1 & -h_1(B) \\ -h_2(B) & 1 \end{pmatrix} \begin{pmatrix} Y_t \\ X_t \end{pmatrix} = \begin{pmatrix} N_{1,t} \\ N_{2,t} \end{pmatrix}$$

▶ Two inputs (N_1, N_2);

▶ Two outputs (Y, X);

▶ Four transfer functions from input to output.

Mink-Muskrat example