Models for SYM-H Prediction

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Nonparametric models

1. Nonlinear additive autoregressive (exogenous) model (NAAR-X)
   - `https://www.jstor.org/stable/pdf/2290787.pdf`
2. Functional coefficient autoregressive model (FAR)
   - **Special cases:** threshold autoregressive model (TAR), exponential AR (EXPAR)

1 Nonlinear additive AR-X model

$$y_t = f_1(y_{t-l_1}) + f_2(y_{t-l_2}) + \cdots + f_p(y_{t-l_p}) + g_1(x_{t-j_1}) + \cdots + g_q(x_{t-j_q}) + \epsilon_t$$

- x denotes exogenous variables, $l_1, \ldots, l_p$ and $j_1, \ldots, j_q$ denote time lags, and ϵ_t is white noise with variance σ^2
- f_i, g_j are estimated using nonparametric smoothing.
- Interaction terms can be included as exogeneous variables

2 Gaussian Process AR-X Model