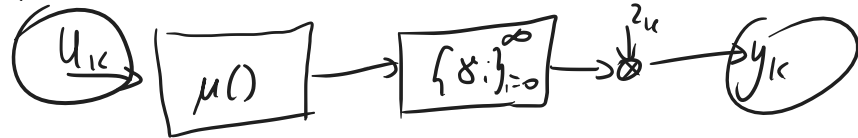


HAMMERSTEIN SYSTEM



$$\mu(u) = \sum_{i=1}^m c_i f_i(u)$$

$$i > m, \gamma_i = 0$$

$$E z_k = 0$$

$$\text{var } z_k < \infty$$

$$z_k, u_k \text{ independent}$$

PARAMETRIC KNOWLEDGE

* BASIS $f_1() \dots f_n()$ — A PRIORI KNOWN

* ORDER OF FIR DYNAMICS

NONP. KNOWLEDGE

$$\{(u_k, y_k)\}_{k=1}^N$$

OVERPARAMETRIZATION APPROACH.

$$y_k = \begin{bmatrix} \delta_0 c_1 \\ \delta_0 c_n \\ \delta_1 c_1 \\ \delta_1 c_n \\ \vdots \\ \delta_m c_1 \\ \delta_m c_n \end{bmatrix}^T \begin{bmatrix} f_1(u_k) \\ f_n(u_k) \\ \vdots \\ f_1(u_{k-m}) \\ f_n(u_{k-m}) \end{bmatrix} + z_k$$

$$y_k = \Theta^T \varphi_k + z_k$$

$$\text{const.} = \dim \Theta = n \cdot (m+1) \quad N \times \dim \Theta$$

$$\hat{\Theta} = (\Phi_N^T \Phi_N)^{-1} \Phi_N^T Y_N$$

$$\Phi_N = \begin{bmatrix} \varphi_1^T \\ \vdots \\ \varphi_N^T \end{bmatrix}$$

$$\hat{\Theta} \longrightarrow \hat{c}, \quad \hat{\gamma}$$

$$c = \begin{bmatrix} c_1 \\ c_2 \\ \vdots \\ c_n \end{bmatrix}, \quad \gamma = \begin{bmatrix} \gamma_0 \\ \gamma_1 \\ \vdots \\ \gamma_m \end{bmatrix}$$

DEF.

$$M = \gamma \cdot c^T = \begin{bmatrix} \gamma_0 c_1 & \gamma_0 c_2 & \dots & \gamma_0 c_n \\ \gamma_1 c_1 & \gamma_1 c_2 & \dots & \gamma_1 c_n \\ \vdots & \vdots & \ddots & \vdots \\ \gamma_m c_1 & \gamma_m c_2 & \dots & \gamma_m c_n \end{bmatrix} [c_1, c_2, \dots, c_n] = \begin{bmatrix} \gamma_0 c_1 & \gamma_0 c_2 & \dots & \gamma_0 c_n \\ \gamma_1 c_1 & \gamma_1 c_2 & \dots & \gamma_1 c_n \\ \vdots & \vdots & \ddots & \vdots \\ \gamma_m c_1 & \gamma_m c_2 & \dots & \gamma_m c_n \end{bmatrix}$$

rank(M) = 1

SVD(M)