Matlab HW4: Exercise from Chap 3

曾柏軒 (Po-Hsuan Tseng)
phtseng@ntut.edu.tw

October 18, 2016

1 Type 2 Signal and the Least Squares Estimator

Type 2 Signal and the Least Squares Estimator

Example 1 (Type 2: Line Signal)

Given the observed data model $x[n] = 1 + 0.2n + w[n]$ where $w[n]$ is a WGN with unit variance. Find the least squares estimate of parameters $[A\ B]^T$ from the line model $s[n] = A + Bn$.
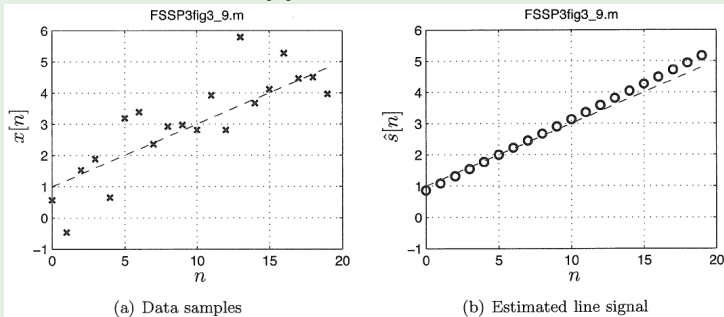

(a) Data samples

(b) Estimated line signal

Figure 1: Least squares estimate of a noisy line signal. The true line signal $s[n] = 1 + 0.2n$ is shown as the dashed line, its points having been connected for easier viewing. The estimated line signal is $\hat{s}[n] = 0.8648 + 0.2265n$ and is shown by o's.

Ref: Figure 2.2

- Use the function inv(.), randn(.)
- Recall from the last exercise: How to generate Figure 2.2 (the clot signal with random noise)

Department of Electronic Engineering, National Taipei University of Technology

Type 2 Signal and the Least Squares Estimator

Example 2 (Type 2: Periodic Signal)

Run the program **FSSP3exer3_7.m** for $N = 50$ to yield the signal sample estimates shown in Fig 3.10b. Then increase N to $N = 1000$ and K to $K = 100$, and compare the results to the true signal, which is $s[n] = n$ for $n = 0, 1, ..., 9$
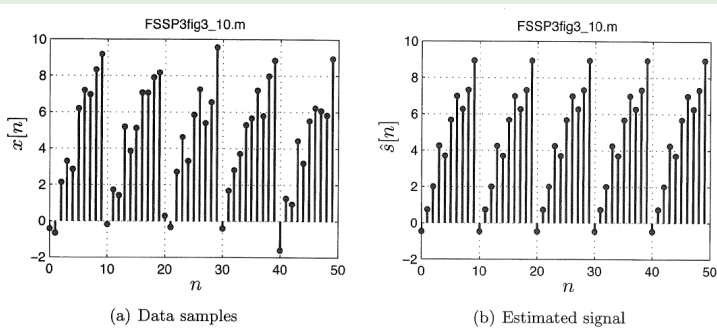

(a) Data samples   (b) Estimated signal

Figure 2: A noisy periodic signal and its estimated signal using the linear model least squares parameter estimator