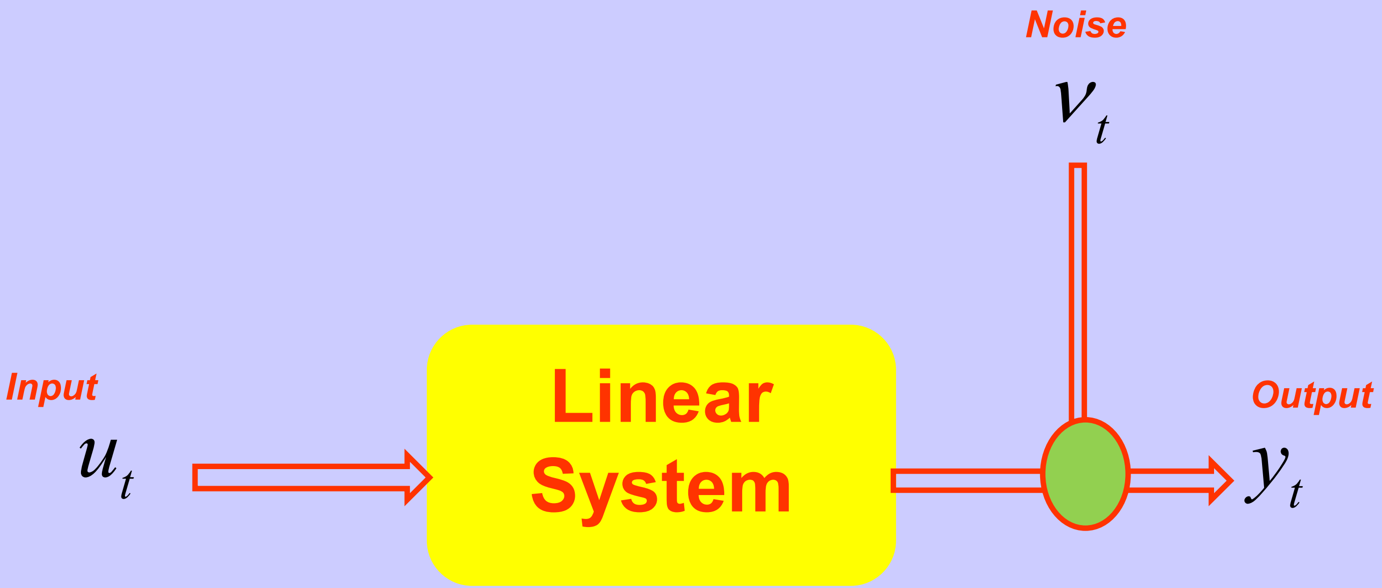
Thurs, 4-11-19
Lagged Correlation (cont.)

1. **Demo10a: lagged response of a simulated input-output system**
2. **Sample runs of geosa10**

Assignment a10: due next Tuesday

Demo10a: lagged response in a simulated system



Demo10a
Input: simulate wth AR process

$$u_t + a_1 u_{t-1} = e_t$$

Scaled such that variance is 1.0

Specified parameter

white noise, normal

Demo10a
Output: compute as
f(current and last year's input, noise)

$$y_t = b_0 u_t + b_1 u_{t-1} + v_t$$

Noise – assume normally distributed white noise

Constraints:

$$\left.\begin{aligned} &b_0 + b_1 = 1 \\ &b_0, b_1 > 0 \end{aligned}\right\}$$

Partition the dependence on this year's and last year's input

Demo10a
signal/noise ratio

$$R = \underbrace{\frac{\operatorname{std}(u_t)}{\operatorname{std}(v_t)}}$$

Ratio of standard deviations of input and noise

Demo10a
99% confidence interval on ccf an irf

- For **ccf,** from user-written function quenouille.m (eqn from last lecture), with additional step of Fisher Z-transform of sample cross-correlations (after Angell 1981)
    - ❑ Lags up to K used for autocorrelation adjustment
    - ❑ K is highest lag that BOTH time series have sample autocorrelations greater than zero
- For **irf**, from Matlab function cra, which also uses Quenouille's equation, but considering more lags of the sample acf's of the two series (generally gives slightly wider 99% CI)

Demo10a
Specifications and assessment

1) a_1 autoregressive coefficient for input

2) b_1 / b_0 relative importance of last year's and this year's input

3) $\dfrac{1}{R} = \dfrac{\mathrm{std}(\nu)}{\mathrm{std}(u_t)}$ inverse of signal/noise ratio

Specify

1) Time plots

2) ccf's, "raw" and systems

View

Sample runs of geosa10…