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% Exercise 2.2

% Linear regression model for AR(2) process

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% Construction of matrices on which to run the regression

V1=AR2sim(3:end); % matrix of values from 3 to end

V2=AR2sim(2:end-1); % matrix of values from 2 to end-1

V3=AR2sim(1:end-2); % matrix of values from 2 to end-1

V23=[V2, V3];

Vi23=[ones(size(V1,1),1), V2, V3];

% Model fitting

AR2LMdl=fitlm(V23,V1);

AR2FitLM=transpose(AR2LMdl.Coefficients.Estimate)\*transpose(Vi23);

% AR2LMdl =

%

% Linear regression model:

% y ~ 1 + x1 + x2

%

% Estimated Coefficients:

% Estimate SE tStat pValue

% \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_

%

% (Intercept) 0.53782 0.11671 4.608 3.3505e-05

% x1 0.43607 0.13751 3.1713 0.0027323

% x2 -0.23682 0.13576 -1.7445 0.087907

%

%

% Number of observations: 48, Error degrees of freedom: 45

% Root Mean Squared Error: 0.276

% R-squared: 0.192, Adjusted R-Squared 0.156

% F-statistic vs. constant model: 5.33, p-value = 0.00836

% Figure

figure; stepp=3:1:size(V1,1)+2;

plot(stepp,V1' , 'b->',stepp, AR2FitLM, 'r-o', 'LineWidth', 1.5 );

legend('AR(2) Simulated', 'AR(2) Fitted Linear Model','Location','southeast');

title('AR(2) Simulated vs. Fitted Linear Model','Fontsize',15);

xlabel('Time','Fontsize',15), ylabel('AR(2)','Fontsize',15);

set(gca,'FontSize',15);