```
function [xhist,zhist] = mcltisim(F,Gamma,H,Q,R,xbar0,P0,kmax)
% ltisim : Monte-Carlo simulation of a linear time invariant system.
%
%
% Performs a truth-model Monte-Carlo simulation for the discrete-time
% stochastic system model:
%
% x(k+1) = F*x(k) + Gamma*v(k)
% z(k) = H*x(k) + w(k)
%
% Where v(k) and w(k) are uncorrelated, zero-mean, white-noise Gaussian
random
% processes with covariances E[v(k)*v(k)'] = Q and E[w(k)*w(k)'] = R. The
% simulation starts from an initial x(0) that is drawn from a Gaussian
% distribution with mean xbar0 and covariance P0. The simulation starts at
% time k = 0 and runs until time k = kmax.
%
%
% INPUTS
%
% F ----------- nx-by-nx state transition matrix
%
% Gamma ------- nx-by-nv process noise gain matrix
%
% H ----------- nz-by-nx measurement sensitivity matrix
%
% Q ----------- nv-by-nv symmetric positive definite process noise covariance
% matrix.
%
% R ----------- nz-by-nz symmetric positive definite measurement noise
% covariance matrix.
%
% xbar0 ------- nx-by-1 mean of probability distribution for initial state
%
% P0 ---------- nx-by-nx symmetric positive definite covariance matrix
% associated with the probability distribution of the initial
% state.
%
% kmax -------- Maximum discrete-time index of the simulation
%
%
% OUTPUTS
%
% xhist ------- (kmax+1)-by-nx matrix whose kth row is equal to x(k-1)'.
Thus,
% xhist = [x(0), x(1), ..., x(kmax)]'.
%
% zhist ------- kmax-by-nz matrix whose kth row is equal to z(k)'. Thus,
zhist
% = [z(1), z(2), ..., z(kmax)]. Note that the state vector
% xhist(k+1,:)' and the measurement vector zhist(k,:)'
% correspond to the same time.
```

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%
%
+------------------------------------------------------------------------
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% References:
%
%
% Author:
%
+========================================================================
==+

% Initialize the output vectors
xhist = zeros(kmax+1, length(xbar0));
zhist = zeros(kmax, size(H, 1));

% Draw initial condition and save
x0 = mvnrnd(xbar0, P0, 1);
xhist(1, :) = x0;

% Run the sim
x_last = x0.';
for k=1:kmax
    % Propagate state
    vk = mvnrnd(zeros(size(Q, 1)), Q, 1).'; % Could pregenerate for
computation
    x = F*x_last + Gamma*vk;
    xhist(k+1, :) = x.';

    % Take measurement
    wk = mvnrnd(zeros(size(R, 1)), R, 1).';
    zk = H*x + wk;
    zhist(k, :) = zk;

    % For next iteration
    x_last = x;
end

Not enough input arguments.

Error in mcltisim (line 59)
xhist = zeros(kmax+1, length(xbar0));
             ^^^^
```

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