
Code Implementation of the EIF

Table of Contents

Basic EIF Implementation	1
Results	1
EIF Code	3
Animation Code	3

This portion of the midterm includes the basic EIF Implementation The results, the code for the EIF, and the code for the animation

Basic EIF Implementation

```
clear all;
close all;
load('midterm_data.mat')

P0 = eye(3);      % initial covariance
X0 = X_tr(:,1);   % Initial estimate state
% X0 = zeros(3,1);
Ts = 0.1;         % Time step
eif = EIF(X0,P0);
ra = RobotAnimation(m,X_tr);

for ii=2:length(t)
%     u = [v(ii);om(ii)]; % Get input
    u = [v_c(ii);om_c(ii)]; % Get input
    eif.Predict(Ts,u); % Predict

%     Update for each measurement
    for jj=1:length(m)
        ell = m(:,jj);
        r = range_tr(ii,jj);
        phi = bearing_tr(ii,jj);
        eif.Update(r,phi,ell)
    end

    ra.Update(eif.mu,X_tr(:,ii),range_tr(ii,:),bearing_tr(ii,:));
    eif.UpdateHistory();
%     pause(0.05);

end

ra.drawEstimateTrack(eif.mu_history);
```

Results

```
% Variance and standard deviation of the error covariance diagonal
entries
```

```
P_var =  
    reshape([eif.P_history(1,1,:);eif.P_history(2,2,:);eif.P_history(3,3,:)],3,  
    []);  
P_std = sqrt(P_var);  
  
% Calculate errors  
error_x = eif.mu_history(1,:)-X_tr(1,:);  
error_y = eif.mu_history(2,:)-X_tr(2,:);  
error_th = eif.mu_history(3,:)-X_tr(3,:);  
ex = mean(norm(error_x));  
ey = mean(norm(error_y));  
eth = mean(norm(error_th));  
  
% Plot values of the information vector versus time  
figure(1),clf;  
plot(t,eif.zeta_history(1,:));  
hold on  
plot(t,eif.zeta_history(2,:));  
plot(t,eif.zeta_history(3,:));  
title("Information vector vs time");  
legend('x component','y component','z component')  
  
% Plot true and estimated  
figure(2),clf;  
subplot(3,1,1)  
plot(t,eif.mu_history(1,:), 'b');  
hold on  
plot(t,X_tr(1,:), 'g');  
title(" x Position");  
legend("Estimate","True");  
  
subplot(3,1,2)  
plot(t,eif.mu_history(2,:), 'b');  
hold on  
plot(t,X_tr(2,:), 'g');  
title(" y Position");  
legend("Estimate","True");  
  
subplot(3,1,3)  
plot(t,eif.mu_history(3,:), 'b');  
hold on  
plot(t,X_tr(3,:), 'g');  
title("Heading");  
legend("Estimate","True");  
  
% Plot the error  
figure(3),clf;  
subplot(3,1,1)  
plot(t,error_x, 'r');  
hold on  
plot(t,2*P_std(1,:), 'b');  
plot(t,-2*P_std(1,:), 'b');
```

```
legend('error (m)', '2*std');  
title('x pos error')  
  
subplot(3,1,2)  
plot(t,error_y, 'r');  
hold on  
plot(t,2*P_std(2,:), 'b');  
plot(t,-2*P_std(2,:), 'b');  
legend('error (m)', '2*std');  
title('y pos error')  
  
subplot(3,1,3)  
plot(t,error_th, 'r');  
hold on  
plot(t,2*P_std(3,:), 'b');  
plot(t,-2*P_std(3,:), 'b');  
legend('error (rads)', '2*std');  
title('th error')
```

EIF Code

```
%<include>EIF.m</include>  
%
```

Animation Code

```
%<include>RobotAnimation.m</include>  
%
```

Published with MATLAB® R2018a