

```
% gda06_01
%
% upper/lower bounds on localized average using linear programming
% supports Figure 6.1
% data kernel G composed of arithmetic average of model parameters

clear all;

% data equation: mean of d
M=21; % must be odd
N=1;
mtrue = random('Uniform',-1,1,M,1);
mtrue = mtrue - mean(mtrue);
G=ones(N,M)/M;
dtrue=G*mtrue;
dobs=dtrue;

% upper bound:  $m_i \leq 1$ 
ub = ones(M,1);

% lower bound:  $m_i \geq -1$ 
lb = -ones(M,1);

M2 = floor(M/2)+1;
L=0; % counter

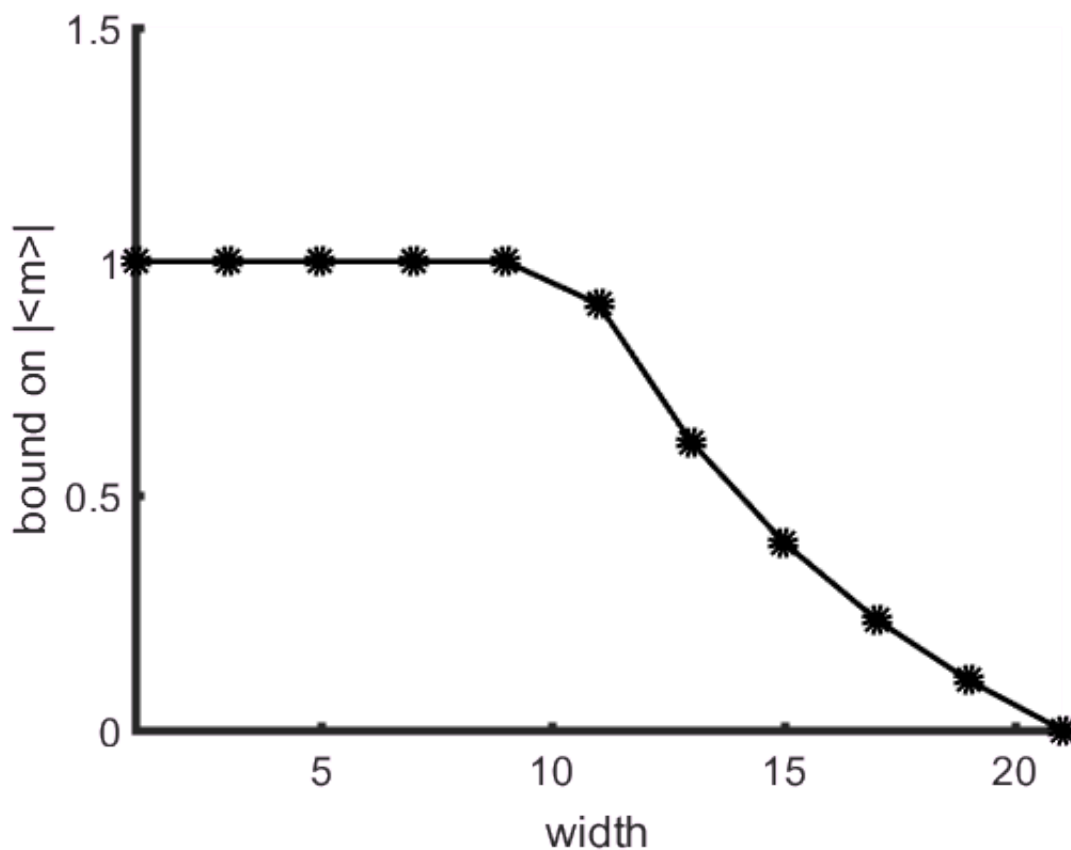
% I need to add an 'options' argument to linprog() for
% MATLAB release 2013a and above, so determine the release year
nMLver = sscanf(version('-release'),'d');
if( nMLver >= 2013 )
    options = optimoptions('linprog','Algorithm','interior-point-legacy');
end

for i=[0:floor(M/2)]
    L=L+1;
    % averageing vector centered at N/2 of width 2*i+1
    f = zeros(M,1);
    f(M2-i:M2+i) = 1;
    I(L)=sum(f);
    f=f/I(L);
    if( nMLver >= 2013 )
        [mest1, fmin(L)] = linprog( f, [], [], G, dobs, lb, ub, options );
        [mest2, fmax(L)] = linprog( -f, [], [], G, dobs, lb, ub, options );
    else
        [mest1, fmin(L)] = linprog( f, [], [], G, dobs, lb, ub );
        [mest2, fmax(L)] = linprog( -f, [], [], G, dobs, lb, ub );
    end
end
```

[illegible]

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figure(1);
set(gca,'LineWidth',3);
set(gca,'FontSize',14);
hold on;
axis( [1, M, 0, 1.5] );
plot(I,-fmax, 'k-', 'LineWidth', 2);
plot(I,-fmax, 'ko', 'LineWidth', 4);
xlabel('width');
ylabel('bound on |<m>|');
```



% Figure 6.1 Bounds on weighted averages of model parameters, m_i , in a problem in which the only
 % information is that the sum of all model parameters is zero. When this observation is combined with the
 % information that each model parameter must satisfy $|m_i| \leq 1$, bounds can be placed on the weighted
 % averages of the model parameters. The bounds shown here are for averages of K neighboring model parameters.

% the bounds are tighter than the [AU Note: replaced “a priori”] prior bounds only when $K > 10$