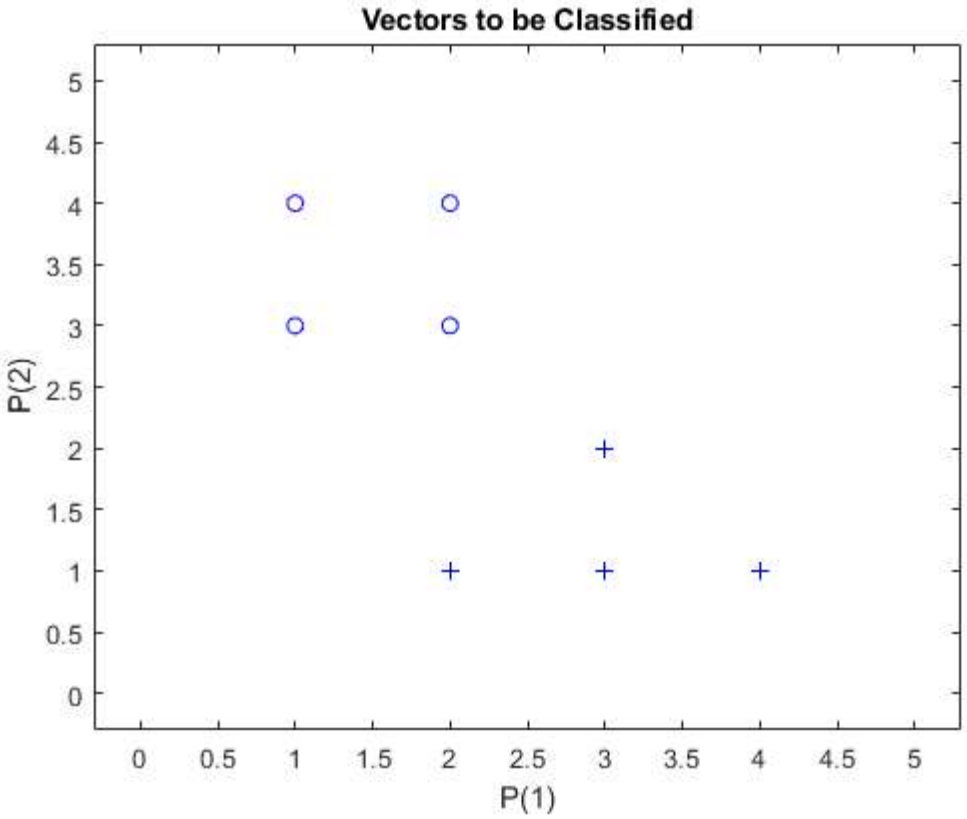
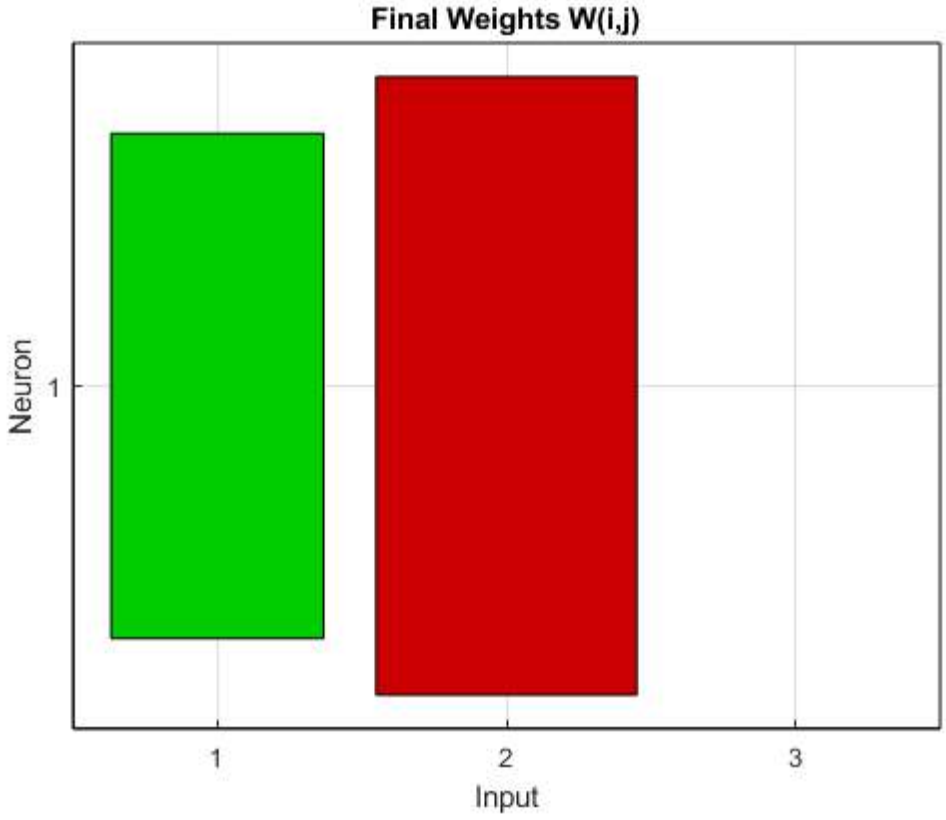
```
%David Melanson
clf reset; clearvars; clc
pausetime = 0;
pauseflag = 1;
maxw = 10;
minw = 0;

%Input vectors
P = [
    2 3 4 3 1 1 2 2;
    1 1 1 2 3 4 3 4;
    1 1 1 1 1 1 1 1
    ];

%Target vector
T = [1 1 1 1 -1 -1 -1 -1];

%Initialize network
%==================================================
[R, Q] = size(P); [S, Q] = size(T);
W0 = zeros(S, R);
B0 = ones(S, 1);

figure(5)
plotpv(P(1:R-1,:), hardlim(T));

% Plot original values
%==================================================
pause(pausetime);
figure(1);
hintonw(W0, maxw, minw);
title('Original Weights W(i,j)');

% TRAIN THE NETWORK
%==================================================
% TRAINING PARAMETERS
disp_freq = 1;
max_epoch = 10;
% lr = 0.1;
% dr = lr/3;
% lp Learning Parameter
% lr Learning Rate
% dr Decay Rate
lr = 1;
lp.lr = lr;
lp.dr = 0;

W = W0;
B = B0;

for epoch = 1:max_epoch
    for q = 1:Q
        % PRESENTATION PHASE
        A = T(:, q);
        % LEARNING PHASE
        dW = learnhd(W, P(:, q), [], [], A, [], [], [], [], [], lp, []);
        W = W +dW;
        if pauseflag == 1
            pause(pausetime)
```

```
            figure(1)
        end
    end
    %end loop if solution found
    if (hardlims(W*P) == T)
        break
    end
    % DISPLAY PROGRESS
    if rem(epoch, disp_freq) == 0
        pause(pausetime)
        hintonw(W, maxw, minw)
        title('Weights W(i,j)');
    end
end

% PLOT FINAL VALUES
hintonw(W, maxw, minw);
title('Final Weights W(i,j)');
pause(pausetime);

% SUMMARIZE RESULTS
%=================================================
disp('With inputs of ');
P

disp('and weights of ');
W

disp('The network responds with outputs');
A = hardlims(W*P)
```

```
With inputs of

P =

     2     3     4     3     1     1     2     2
     1     1     1     2     3     4     3     4
     1     1     1     1     1     1     1     1

and weights of

W =

     6    -9     0

The network responds with outputs

A =

     1     1     1     1    -1    -1    -1    -1
```




*Published with MATLAB® R2022a*