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

%Input vectors
P = [
    -3 -3 0 0 0 3 3 6 6;
     1 3 1 2 5 3 6 4 5;
     1 1 1 1 1 1 1 1 1
];

%Target vector
T = [-1 -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)
        end
    end
end

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        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 =

-3	-3	0	0	0	3	3	6	6
1	3	1	2	5	3	6	4	5
1	1	1	1	1	1	1	1	1

and weights of

W =

180	100	-10
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The network responds with outputs

A =

-1	-1	1	1	1	1	1	1	1
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