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%--- Perceptron ενός νευρώνα υλοποίηση με συναρτήσεις
load fisheriris
trset=[meas(1:50,1:2); meas(101:150,1:2)]';
class_labels=[ones(1,50) -ones(1,50)];

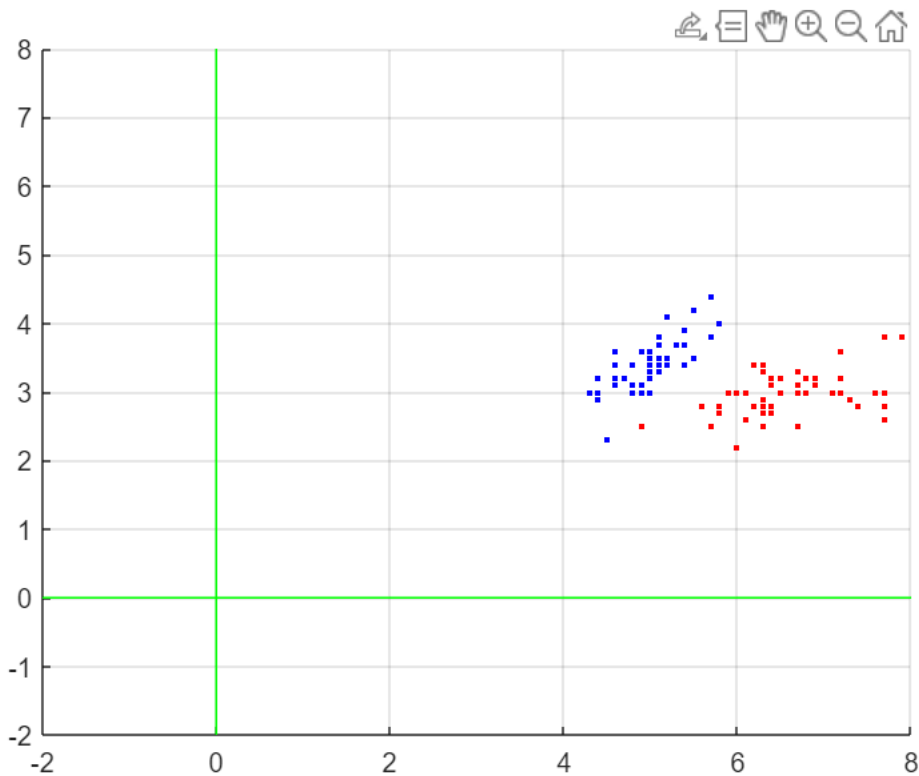
% trset=[ 0 0 1 1;
%         0 1 0 1];
% class_labels= [ -1 -1 -1 1];

```

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% Drawing of data space
close all; figure; hold on;
axis([-2 8 -2 8]); grid on
plot([-2 8],[0 0], 'g-'); plot([0 0],[-2 8], 'g-');
plot(trset(1,1:50),trset(2,1:50), 'b. ');
plot(trset(1,51:100),trset(2,51:100), 'r. ');

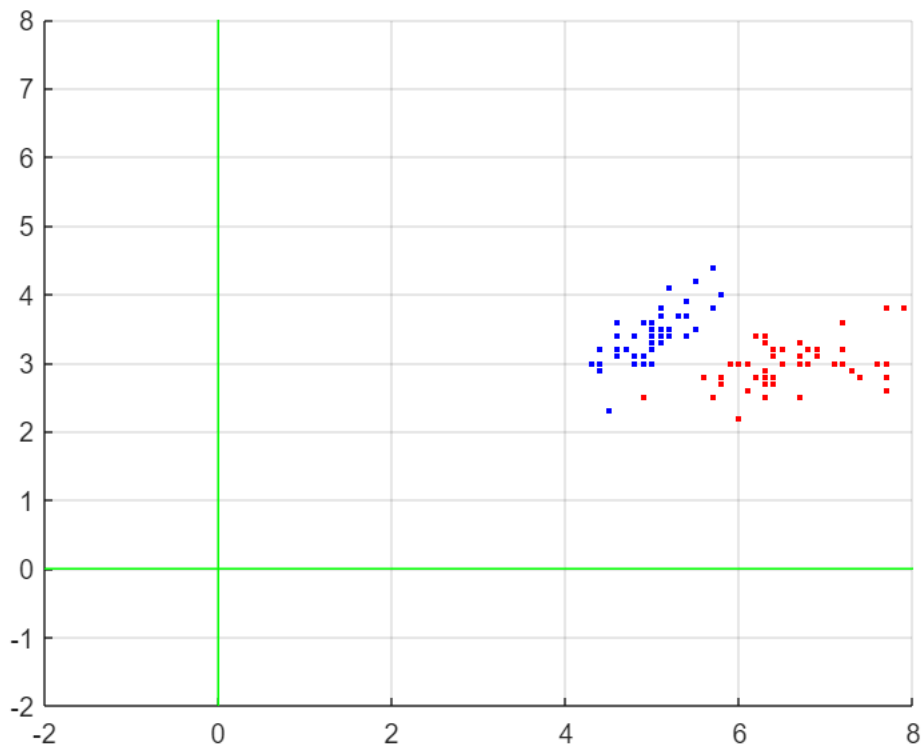
```



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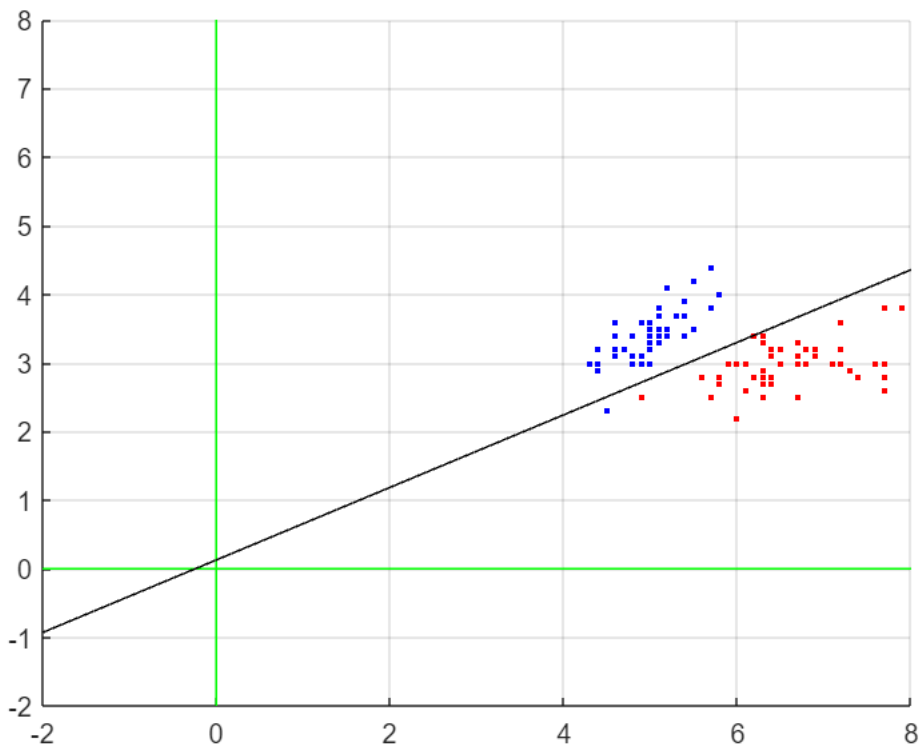
%----- Επιλογή και κλήση του αλγορίθμου (στοχαστική ή με δέσμη)
learning_rate=0.0005;
w = perceptron_batch( trset,class_labels,learning_rate,1);

```



```
%w = perceptron_stochastic( trset,class_labels,learning_rate,2);
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% -- Drawing of the final line --  
t=[-2 8]; l=-w(1)/w(2)*t-w(3)/w(2);h=plot(t,l,'k-');
```



```
% -- Έλεγχος του αποτελέσματος --
X=[trset;ones(1,size(trset,2))];
xclass = sign(w'*X);
vectors_correct_classified=sum(xclass==class_labels)
```

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vectors_correct_classified = 99
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Συναρτήσεις υλοποίησης του Perceptron με εκπαίδευση δέσμης ή στοχαστικά

```
function [ w ] = ...
perceptron_batch(trset,class_labels,learning_rate,error_tolerance )

X=[trset; ones(1,size(trset,2))]; % vector augmentation
w = rand(size(trset,1)+1,1)-0.5 ; % weight initialization
while true
    misclsf = sign(w'*X)~=class_labels;
    if sum( misclsf )<=error_tolerance; break; end
    s = sum( (X.*(misclsf)).*(-class_labels), 2);
    w = w- learning_rate *s;
    % ---- vector and line drawing ----
    t=[-2 8]; l=-w(1)/w(2)*t-w(3)/w(2); h=plot(t,l,'k--');
    pause(.1); delete(h); delete(h);
    %-----
end
end
```

```

%===== Συνάρτηση με στοχαστική εκπαίδευση =====
function [ weights ] =...
perceptron_stochastic( trset,class_labels,...% values -1, +1
    learning_rate,error_tolerance )
    ftrnum=size(trset,1); % feature number
    N=size(trset,2);      % vector number

    w=rand(ftrnum,1); w0=rand(1); % Weights initialization
    while sum( sign(w'*trset+w0)==class_labels ) < N-error_tolerance
        i=randi(N)
        x = trset(:,i);
        % ---- vector and line drawing ----
        t=[-2 8]; l=-w(1)/w(2)*t-w0/w(2); h=plot(t,l,'k--');
        pause(.1); delete(h); delete(h);
        %-----
        d = w'*x + w0;
        if( d*class_labels(i) < 0);
            w = w + class_labels(i)*learning_rate*x;
            w0= w0+ learning_rate*class_labels(i);
        end
    end
    weights = [w; w0];
end

```