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close all
clear

sig_fun = @(x) 1 ./ (1+exp(-x));

k = 100;
dimension = 2;

mu1 = [1;1];
co1 = [1 0; 0 1];
mu2 = [-5;-5];
co2 = [1 0; 0 1];
X1 = generate_gaussian_data(k, dimension, mu1, co1);
X2 = generate_gaussian_data(k, dimension, mu2, co2);

y1 = ones([100,1]);
y2 = zeros([100,1]);

X = [X1, X2];
X = [X; ones([1,200])];
y = [y1; y2]';

weight = [-1; 1; 1];
x_range = -6:1:4;
figure;
scatter(X1(1,:), X1(2,:), 'filled', "MarkerFaceColor",'c', "SizeData",20)
hold on
scatter(X2(1,:), X2(2,:), 'filled', "MarkerFaceColor",'r', "SizeData",20)
for i=1:800
    z = weight'*X;
    p = sig_fun(z);
    plot(x_range, (-weight(3) - weight(1).*x_range)./weight(2))
    hold on
    loss = sum(y.*log2(p) + (1-y).*log2(1-p))/200;
    grad = X*(y'-p');
    hessian = -X*p'.*(1-p)*X';
    % hessian =
    weight = weight - pinv(hessian)*grad;
end
hold off

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