```
   % Generate synthetic data
    rng(0); % For reproducibility
    data1 = mvnrnd([3,3], [1,0.5;0.5,1], 100);
    data2 = mvnrnd([-1,-3], [1,0;0,1], 100);
    X = [data1; data2];

    % Apply EM algorithm
    max_iter = 10;
    tol = 1e-6;
    [mu, sigma, p] = EM_GMM(X, max_iter, tol);

    % Plotting
    figure;
    hold on;
    scatter(X(:,1), X(:,2), 10, 'filled');

    % Create a grid for the contour plot
    [x, y] = meshgrid(linspace(min(X(:,1))-1, max(X(:,1))+1, 100),
linspace(min(X(:,2))-1, max(X(:,2))+1, 100));
    for i = 1:2
        F = mvnpdf([x(:) y(:)],mu(i,:),sigma(:,:,i));
        F = reshape(F,length(y),length(x));
        contour(x, y, F); hold on
    end

    hold off;
    xlabel('X');
    ylabel('Y');
    title('Gaussian Mixture Model Contours');
```