```
%==========================================================================
%GENERATES THE DATASET OF POINTS
%==========================================================================

num_points = 1000000;
radius = 2;
num_clusters = 5;
max_val = 100;
point_data = [];

X = [];
Y = [];
Z = [];

for i = 1 : num_clusters

  origin_x = max_val*rand();
  origin_y = max_val*rand();
  origin_z = max_val*rand();

  origin = [origin_x origin_y origin_z];

  [temp_point_data temp_X temp_Y temp_Z] = generate_sphere(num_points, radius,
origin);

  temp_point_data(:,4) = i; %hidden classifier

  point_data = [point_data; temp_point_data];

  X = [X ; temp_X];
  Y = [Y ; temp_Y];
  Z = [Z ; temp_Z];

endfor

%==========================================================================
%DISPLAYS THE DATASET
%==========================================================================

figure, scatter3(X,Y,Z)

%==========================================================================
```

```
%BUILDS AND CLUSTERS THE MACRO CLUSTERS
%=============================================================
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N = 3;

num_rows = size(point_data,1);
point_data = sortrows(point_data, 1:N);

LH_data = point_data(1 : num_rows - 1, 1:N); %left_hand operand
RH_data = point_data(2 : num_rows, 1:N); %right_hand operand

diff_vector = sum((LH_data .- RH_data).^2,2).^(1/2); %norm of the difference between
adjacent entries

final_delta = mean(diff_vector);

tic; [cluster_array] = EMC_anchor_clustering(point_data, final_delta, N); toc

%=============================================================
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%DISPLAYS THE MACRO CLUSTERS
%=============================================================
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total_num_items = size(point_data,1);

num_clusters = size(cluster_array,2);
C = zeros(total_num_items,3); %used to color the clustered points when displayed
S = ones(total_num_items,1) *3; %sizes the points in the display

X = point_data(:,1);
Y = point_data(:,2);
Z = point_data(:,3);

for i = 1 : num_clusters

  temp_indexes = cluster_array{i};

  %assigns a random color to the points in each class
  C(temp_indexes,1) = rand(); %r
  C(temp_indexes,2) = rand(); %g
  C(temp_indexes,3) = rand(); %b

endfor

figure, scatter3(X,Y,Z,S,C)
```

```
max_X = max(X);
max_Y = max(Y);
max_Z = max(Z);

xlim([0 1.25*max_X]);
ylim([0 1.25*max_Y]);
zlim([0 1.25*max_Z]);

daspect([1 1 1]); %sets the aspect one to one

%=================================================================
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%COUNTS MACRO CLASSIFICATION ERRORS
%=================================================================
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num_classification_errors = 0;

for i = 1 : num_clusters

  temp_indexes = cluster_array{i};
  temp_cluster = point_data(temp_indexes,:);
  class_vector = temp_cluster(:,N+1);
  class = class_vector(1);

  num_classification_errors = num_classification_errors + sum(class_vector != class);

endfor
```