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

num_points = 10000;
radius = 2;
num_clusters = 15;
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)

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

```
%CLUSTERS THE DATASET
%================================================================
====================

N = 3;

point_data = sortrows(point_data, 1:N);

tic;[final_delta final_cluster_indexes] = vectorized_EMC_clustering_N(point_data,N);toc

%================================================================
====================
%TESTS ACCURACY
%================================================================
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num_clusters = size(final_cluster_indexes,2);
total_num_items = size(point_data,1);

C = zeros(total_num_items,3); %used to color the clustered points when displayed

for i = 1 : num_clusters - 1

  initial_index = final_cluster_indexes(i);
  final_index = final_cluster_indexes(i+1) - 1;

  class_array{i} = point_data(initial_index : final_index, N + 1);

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

endfor

if(total_num_items > final_index)

  class_array{num_clusters} = point_data(final_index + 1 : total_num_items, N + 1);

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

endif

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

```
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%COUNTS CLASSIFICATION ERRORS
%=========================================================================
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num_classification_errors = 0

for i = 1 : num_clusters

  class_vector = class_array{i};
  class = class_vector(1);

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

endfor

%=========================================================================
======================
%DISPLAYS CLUSTERED DATA
%=========================================================================
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S = ones(total_num_items,1)*3; %size of each data point

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