

11-4-19_NOTES

```
%=====
%GENERATES UNDERLYING SHAPE
%=====

t = 0:pi/11:2*pi;

[X,Y,Z] = cylinder(2+t.*cos(t));

figure, surf(X,Y,Z)

%=====
%CONVERTS SHAPE INTO POINT DATA
%=====
counter = 1;

num_rows = size(X,1);
num_cols = size(X,2);

for i = 1 : num_rows

for j = 1 : num_cols

x = X(i,j);
y = Y(i,j);
z = Z(i,j);

data_matrix(counter,:) = [x y z];
counter = counter + 1;

endfor

endfor

figure, scatter3(data_matrix(:,1),data_matrix(:,2),data_matrix(:,3))

%=====
%CATEGORIZES POINTS
%=====

N = 3;

tic;
[final_data_categories_array final_delta] =
optimize_categories_fast_N(data_matrix,N);
toc;

%=====
%IMITATES SHAPE DATA
```

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%=====

min_x = min(data_matrix(:,1));
max_x = max(data_matrix(:,1));

min_y = min(data_matrix(:,2));
max_y = max(data_matrix(:,2));

min_z = min(data_matrix(:,3));
max_z = max(data_matrix(:,3));

num_iterations = 15000;

dimensions = 1:N;
delta = final_delta;
counter = 1;

new_data = [];

tic;

for i = 1 : num_iterations

temp_x = min_x + rand()*(max_x - min_x);
temp_y = min_y + rand()*(max_y - min_y);
temp_z = min_z + rand()*(max_z - min_z);

input = [temp_x temp_y temp_z];

[cluster] = NM_pred_spot_cluster(input, delta, dimensions, data_matrix);

if(size(cluster,1) > 0)

input(3) = cluster(1,3);
new_data(counter,:) = input;
counter = counter + 1;

endif

endfor

toc

figure, scatter3(new_data(:,1),new_data(:,2),new_data(:,3))
```