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                                generate_categories_3D
function [data_categories_array anchor_array] =
generate_categories_3D(data_array,max_delta)
%assumes the data_set is a vector of real numbers and returns categories on that
data_set

[x num_items] = size(data_array);

index = 1; %the position in the data_set
copy_data_array = data_array;

anchor = copy_data_array{index};%sets the first anchor data point
num_anchors = 1;
anchor_array{num_anchors} = anchor; %we store each anchor in a vector that is
returned by the function

cat_num = 0; %the position in the data_categories_array
is_taken = zeros(1,num_items + 1); %a vector we use to keep track of items that
have been used

%iterates until we run out of data points in the array
while(is_taken(index) != 1 && index <= num_items)

    cnt = 0; %the position in the queue for the current anchor
    cat_num = cat_num + 1;

    %searches available items for inclusion in the current anchor category
    for j = 1 : num_items

        temp = copy_data_array{j};

        if(is_taken(j) != 1)

            delta = norm(temp - anchor);

            if(delta <= max_delta)

                cnt = cnt + 1;
                queue{cnt} = temp;
                is_taken(j) = 1;

            endif

        endif

    endif

    cntfor

    if(cnt >= 1) %if the category isn't empty we load its contents into the
data_categories_array

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                                generate_categories_3D

    data_categories_array{cat_num} = queue;
    clear queue;

endif

%finds the next available anchor
break_loop = false;

index = index + 1;

while(break_loop == false && index <= num_items)

    temp = copy_data_array{index};

    if(is_taken(index) != 1)

        break_loop = true;
        anchor = copy_data_array{index};
        num_anchors = num_anchors + 1;
        anchor_array{num_anchors} = anchor;

    else

        index = index + 1;

    endif

endwhile

endwhile

endfunction

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