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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)

                %this is to ensure we ignore any labels in the data
                calc_temp = temp(1:3);
                anchor_temp = anchor(1:3);

                delta = norm(calc_temp - anchor_temp);

                if(delta <= max_delta)

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

                endif

            endif

        endif
    endif
end

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                                generate_categories_3D
endifor

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

        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

```