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function [point_matrix color_matrix] = embedd_dataset_display(dataset,
embedding_dimensions, num_simulations, N)

num_rows = size(dataset,1);
class_labels = unique(dataset(:,N + 1));
num_classes = size(class_labels,1);

average_matrix = zeros(num_classes, N);

for i = 1 : num_classes

    class_rows = find(dataset(:,N + 1) == i);
    class_vectors = dataset(class_rows,1:N);

    average_vector = mean(class_vectors);
    average_matrix(i,:) = average_vector;
    variance_vector(i) = calculate_std_dev_matrix(class_vectors,N);
    class_rows_vector{i} = class_rows;

endfor

%=====
%TAKES ALL PAIRS OF DIFFERENCES
%=====
=====

temp_dataset = average_matrix;
temp_matrix = repmat(temp_dataset', [1 1 num_classes]);
ref_dataset = shiftdim(temp_matrix,2);
diff_matrix = sum((temp_dataset.-ref_dataset).^2,2);

%=====
%GENERATES AN EMBEDDING BASIS
%=====
=====

max_distance = max(max(diff_matrix));
min_diff = Inf; %initial value for the loop

Embedding_Matrix =
rand(num_classes,embedding_dimensions,num_simulations)*max_distance;

for i = 1 : num_simulations

    temp_dataset = Embedding_Matrix(:, :, i);
    temp_matrix = repmat(temp_dataset', [1 1 num_classes]);

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ref_dataset = shiftdim(temp_matrix,2);
temp_diff_matrix = sum((temp_dataset.-ref_dataset).^2,2);

temp_diff = sum(sum(abs(temp_diff_matrix .- diff_matrix)));

if(temp_diff < min_diff)

    min_diff = temp_diff;
    embedding = temp_dataset;

endif

endfor

%=====
%COMPLETES THE EMBEDDING
%=====

point_matrix = zeros(num_rows,embedding_dimensions);

for i = 1 : num_classes

    basis = embedding(i,:);
    class_rows = class_rows_vector{i};
    num_points = size(class_rows,1);

    point_matrix(class_rows,:) = basis +
-2*rand(num_points,embedding_dimensions)*variance_vector(i) +
variance_vector(i)*ones(1,embedding_dimensions);

endfor

%colors the embedding by class
color_matrix = zeros(num_rows,3);

for i = 1 : num_classes

    class_rows = class_rows_vector{i};
    color_matrix(class_rows,:) = ones(size(class_rows,1),3).*rand(1,3);

endfor

endfunction

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