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%=====
%ITERATIVE DELTA CLUSTERING
%=====

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%=====
%LOADS DATASET
%=====

%clears the memory and the command prompt
clear
clc
%-----

file_path = '/Users/charlesdavi/Desktop/Datasets/UCI/credit_short.txt';
dataset = csvread(file_path);
num_rows = size(dataset,1);
N = size(dataset,2) - 1;

%=====
%NORMALIZES DATASET
%=====

[final_dataset final_weight_vector final_nearest_neighbors] = normalize_datasetBT(dataset,N);
dataset = final_dataset;

%loads a blank secondary classifier used below
for i = 1 : num_rows

    dataset(i,N+2) = 0;

endfor

%=====
%CLUSTERS THE DATASET (MUTUALLY EXCLUSIVE)
%=====
mutually_exclusive = 1; %generates mutually exclusive clusters
geometric = 0; %uses arithmetic averaging
[final_cluster_matrix final_delta] = iterative_delta_clustering_unsup(dataset, mutually_exclusive, geometric, N);

delta = final_delta;

%=====
%TESTS CLUSTER ACCURACY
%=====

for i = 1 : num_rows

    actual_class = dataset(i,N+1);

    x = find(final_cluster_matrix(i,:) == 1); %rows in the cluster_objects3D
    class_vector = dataset(x,N+1);

    y = (class_vector != actual_class);

    num_errors = sum(y);
    num_entries = size(y,1);

    if(num_entries != 0)

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    accuracy_vector(i) = 1 - num_errors/num_entries;

else

    accuracy_vector(i) = -1;

endif

endfor

x = find(accuracy_vector == -1);

temp = accuracy_vector;
temp(x) = [];
mean(temp)

%=====
%LABELS EACH ROW OF THE DATASET
%=====

for i = 1 : num_rows

    x = find(final_cluster_matrix(i,:) == 1);
    dataset(x,N+2) = i; %sets the classifier to the row number

endfor

%=====
%CLUSTERS THE DATASET (NOT MUTUALLY EXCLUSIVE)
%=====

mutually_exclusive = 0; %generates non-mutually exclusive clusters
geometric = 0; %uses arithmetic averaging
[cluster_matrix final_delta] = iterative_delta_clustering_unsup(dataset, mutually_exclusive, geometric, N);

%=====
%RUNS MODAL PREDICTION ON SECONDARY CLASSIFIERS
%=====

for i = 1 : num_rows

    cluster_matrix(i,i) = 0;
    x = find(cluster_matrix(i,:) == 1); %rows in cluster i
    class_vector = dataset(x,N+2); %classes of cluster

    if(size(class_vector,1) > 0)

        predicted_row = mode(class_vector); %the modal class is the predicted row
        predicted_class_vector(i) = dataset(predicted_row,N+1);

    else

        predicted_class_vector(i) = -1;

    endif

endfor

x = find(predicted_class_vector == -1);

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temp = predicted_class_vector;  
temp(x) = [];  
num_entries = size(temp,2);  
num_rejections = size(x,2);  
  
actual_class_vector = dataset(:,N+1);  
actual_class_vector(x) = [];  
  
num_errors = sum(actual_class_vector' != temp);  
accuracy = 1 - num_errors/num_entries;
```