Classification

Here Collective feature selection for the extracted features are performed with the use of Bio-Geography-Based optimization algorithm. and Classifying with KNN and LDA and Decision Tree.

There are bunch of options that can be selected and changed. Like Mutation Rate, Feature Num, Classifier type, CostFunction...

(Note: The process is Accelerated Using Parallel Prgramming Toolbox!)

```
% Loading Datas with Labels and Features
clear;
[f1, l1] = importfile('Data\X_train.txt','Data\y_train.txt');
[f2, l2] = importfile('Data\X_test.txt','Data\y_test.txt');

features = [f1; f2];
labels = [l1; l2];
clear f1 f2 l1 l2

% Starting Parallel Pool
p = parpool('local', 4);
```

```
Starting parallel pool (parpool) using the 'local' profile ...
Connected to the parallel pool (number of workers: 4).
```

```
% BBO Parameters
classifier_type = 'tree';
CV_k =10;                                   % Cross Validation K
Range = [1, size(features, 2)];                                  % Range of Produced Answers us
MaxIt = 100;                                % Maximum Search Iteration of the Optimizer
HabitationNum = 60;                        % Number of the Iterations
CostFunction = @(x) Classifier(features, labels, x, classifier_type, CV_k);

% If We Wanna reduce Numeber of Features to n What Would N Be?
FeatureNum = (10:10:120);

% BBO Evaluation for Feature Reduction
for iter = 1:numel(FeatureNum)
    % Log the Solutions
    Sol = DiscreteBBO(CostFunction, HabitationNum, MaxIt, FeatureNum(iter), Range);
    disp(['Solution with ', num2str(FeatureNum(iter)), ' Features : '])
    Sol
end
```

```
Solution with 10 Features :
Sol = struct with fields:
        SIV: [50 55 125 209 227 269 336 409 509 560]
        HSI: 1.4169
        Acc: [0.9379 0.9248 0.9303 0.9310 0.9393 1]
    MeanAcc: 0.9439
Solution with 20 Features :
Sol = struct with fields:
        SIV: [41 54 85 87 127 139 160 174 181 195 200 202 244 280 331 410 434 448 555 561]
        HSI: 1.3961
```

```
        Acc: [0.9506 0.9310 0.9256 0.9323 0.9383 0.9995]
    MeanAcc: 0.9462
Solution with 30 Features :
Sol = struct with fields:
        SIV: [25 54 55 57 117 123 127 248 283 297 300 325 327 361 367 383 384 398 408 419 430 435 439 450 451 468 47
        HSI: 1.3484
        Acc: [0.9650 0.9544 0.9323 0.9361 0.9232 0.9995]
    MeanAcc: 0.9517
Solution with 40 Features :
Sol = struct with fields:
        SIV: [39 41 51 52 58 60 76 83 96 119 129 156 162 171 199 226 227 229 251 298 303 316 335 344 349 366 370 384
        HSI: 1.3728
        Acc: [0.9486 0.9502 0.9186 0.9364 0.9399 0.9995]
    MeanAcc: 0.9489
```

```
delete(gcp('nocreate'))             % ShutDown the Current Pool
clear;
```