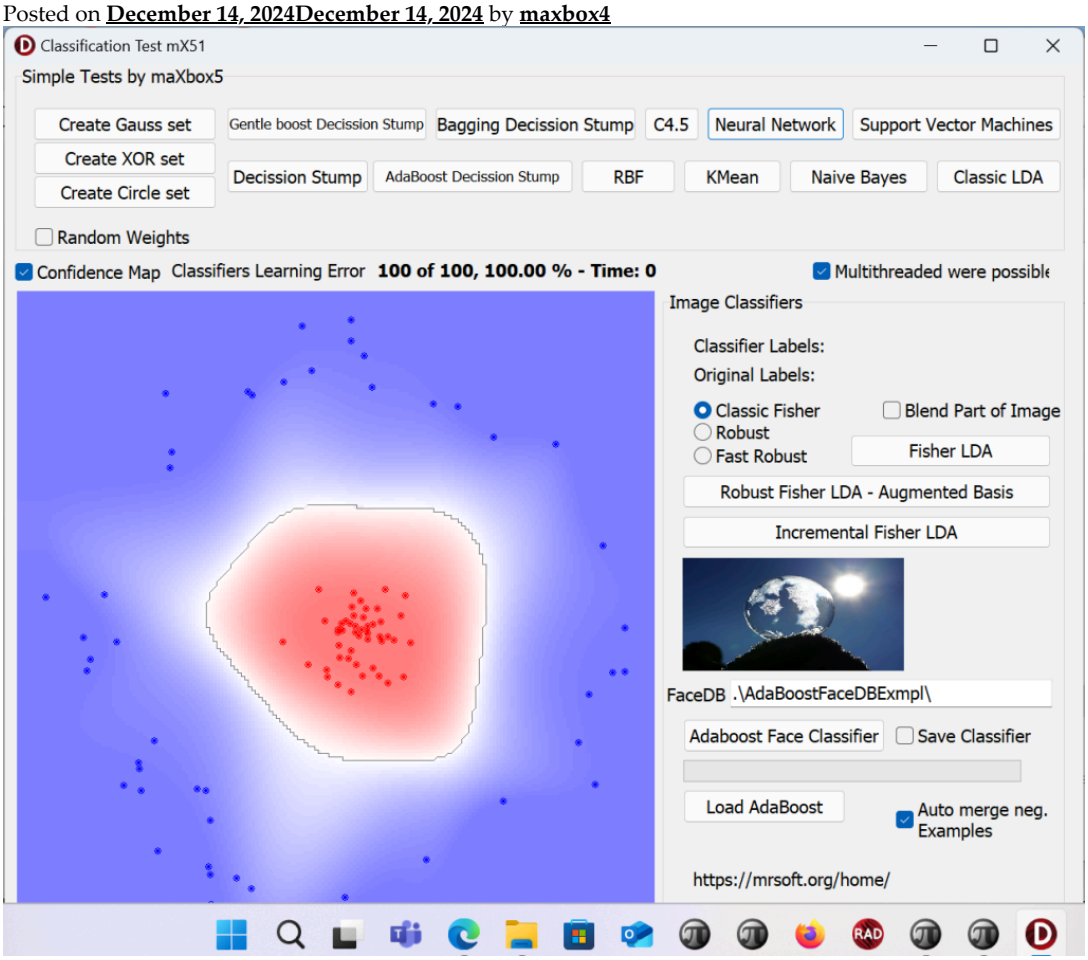
maXbox

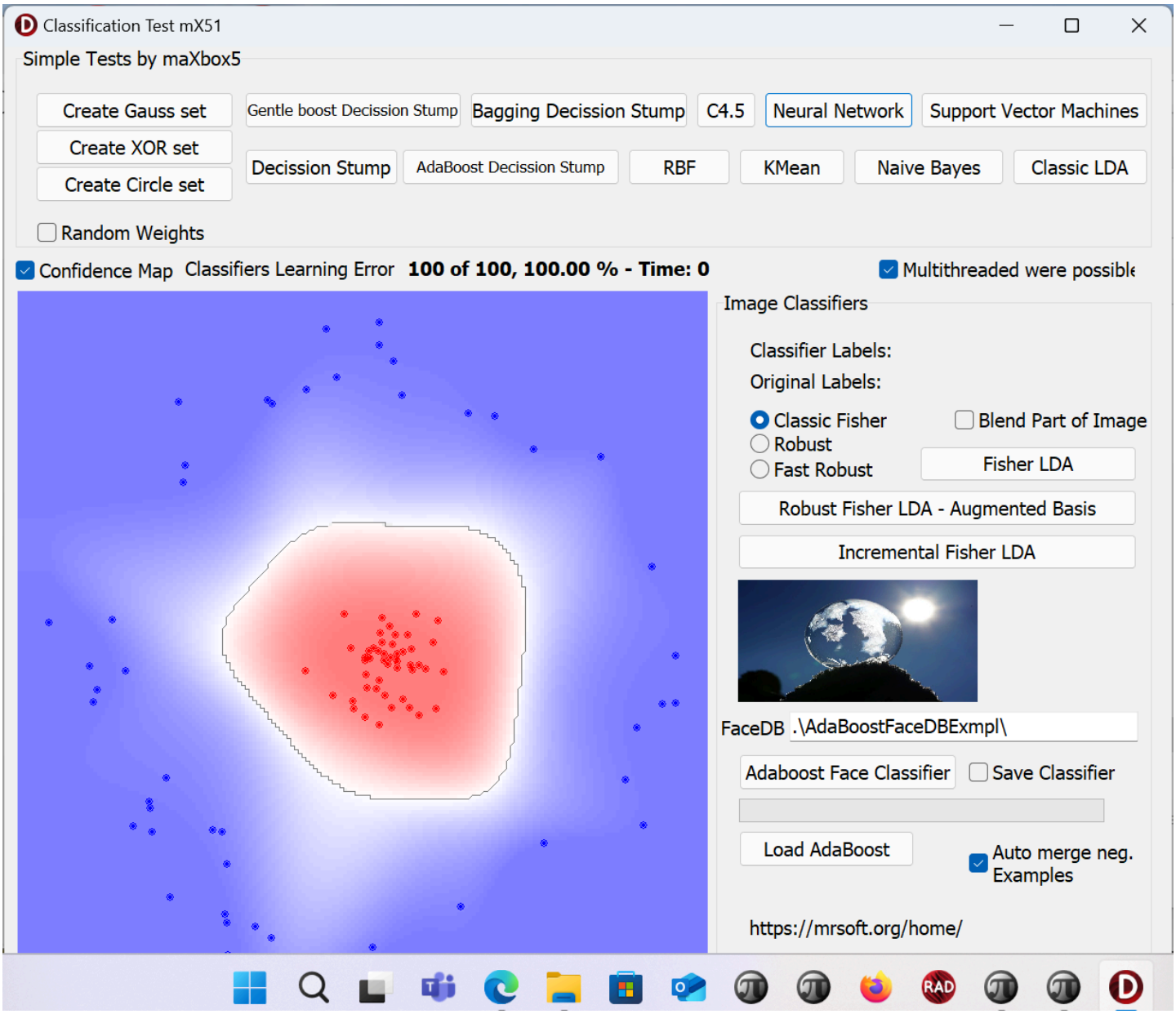
Test Classifier App

Posted on December 14, 2024December 14, 2024 by maxbox4



This **library and** app **contains** classes **for** easy classifier design. **For** simple classifier design check **out** the TestApp – basically this **is** a **unit** test application – **and** see there which classifieres **and** face detectors are available **and** how **to** use them. It's recommended to have base knowledge about the underlying algorithms. Quite a few algorithms have been designed **with** robustness **in** mind (robustness **in** terms **of** outlying pixels **or** occluded areas).

```
      * Support Vector Machines with Least Squares and Lagragian Learning
      * Ensemble Classification Algorithms:AdaBoost,GentleBoost and Bagging
      * All the above classifiers may be used in the Ensemble classification tasks.
      * Features Extractors: Haar1D, Haar2D and the Integral Image approach.
```



Test App for training & teaching

The package from **mrsoft.org** includes:

* Standard Fisher LDA classifier
* Robust (and Fast Robust) version of this classifier
* Incremental (and Robust) Fisher LDA classifier learning.
* Support Vector Machines (least squares and lagrangian learning)
* Naive Bayes
* Simple Decission stumps
* Radial basis function
* C4.5 Decission trees.
* K-means
* Ensemble classifiers: AdaBoost, Gentle Boost, Bagging
* Simple feed forward Neural Nets

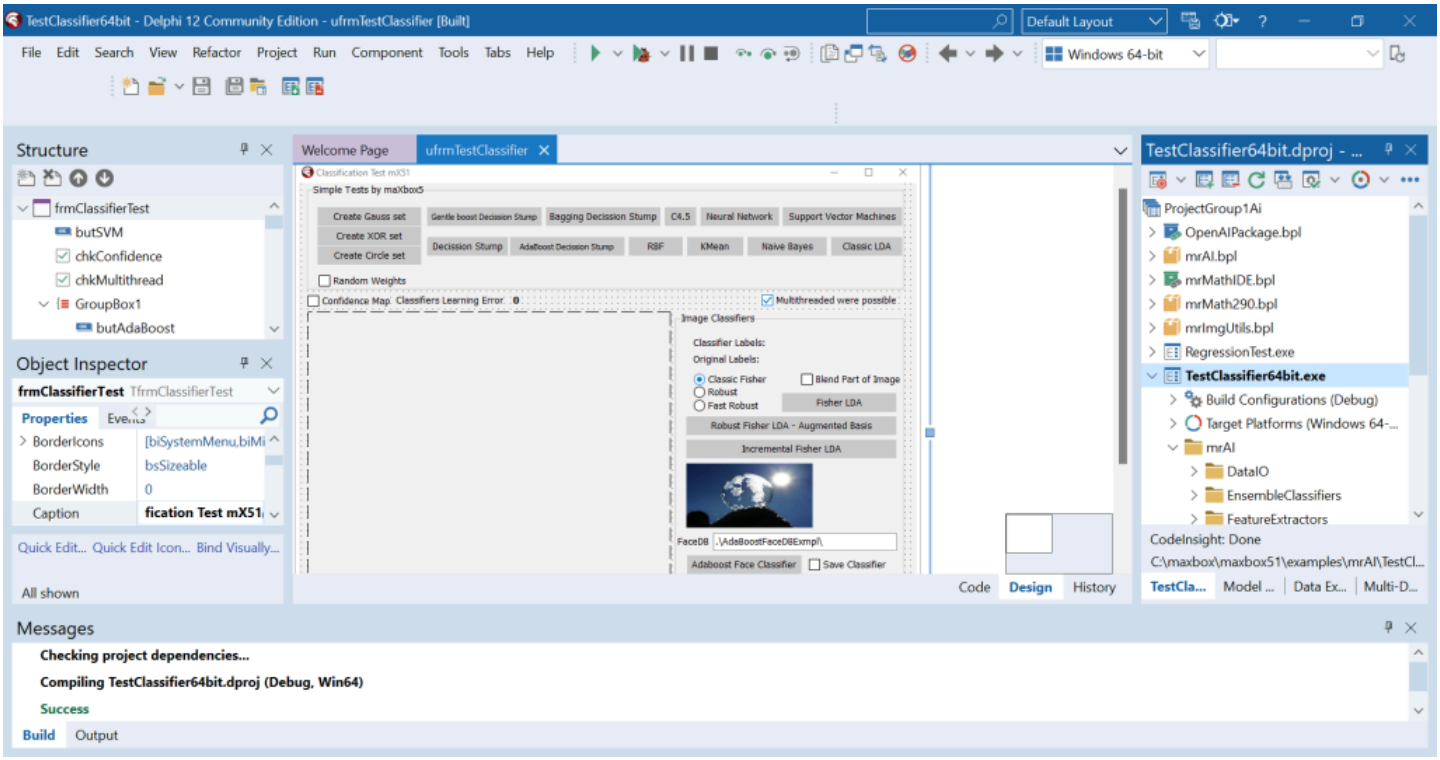
On top of these classifiers there exists a few image database handling routines
and an 1D, 2D Haar Feature extractor which is based on an integral image approach.

A testing application TestClassifier.dpr which shows the usage and performance of these classifiers on
various tasks (e.g. face recognition) which we slightly improved, compiled and signed can be found on git or
sourceforge:

https://github.com/maxkleiner/mrai_mx5/tree/master/TestApp
(https://github.com/maxkleiner/mrai_mx5/tree/master/TestApp)

https://sourceforge.net/projects/maxbox5/files/binaries/TestClassifier64bit.exe/download
(https://sourceforge.net/projects/maxbox5/files/binaries/TestClassifier64bit.exe/download)

```
uses BaseMatrixExamples, math, mathutilfunc, SimpleDecisionStump, AdaBoost,
     CustomBooster, Bagging, EnsembleClassifier, FisherBatchLDA, FisherClassifiers,
     ImageDataSet, ImageMatrixConv, {jpeg,} IncrementalImageDataSet,
     IncrementalFisherLDA, FisherIncrementalClassifiers, BaseIncrementalLearner,
     IntegralImg, Haar2DDataSet, MatrixImageLists, BinaryReaderWriter,
     BaseMathPersistence, DecisionTree45, TreeStructs, NaiveBayes, SVM, RBF,
     kmeans, NeuralNetwork, JSONReaderWriter, MatrixASMStubSwitch, ThreadedMatrix;

unit ufrmTestClassifier;

interface

{.$DEFINE INITRANDSEED}  // uncomment if you do not want the same train set

uses
  Windows, Messages, SysUtils, Variants, Classes, Graphics, Controls, Forms,
  Dialogs, BaseClassifier, ExtCtrls, StdCtrls, Matrix, ComCtrls, Haar2DAdaBoost,
  Haar2DImageSweep, Image2DSweep, Types, Vcl.Imaging.jpeg;

type
  TTrainSetType = (stGauss, stXOR, stCircles);
type
  TfrmClassifierTest = class(TForm)
```



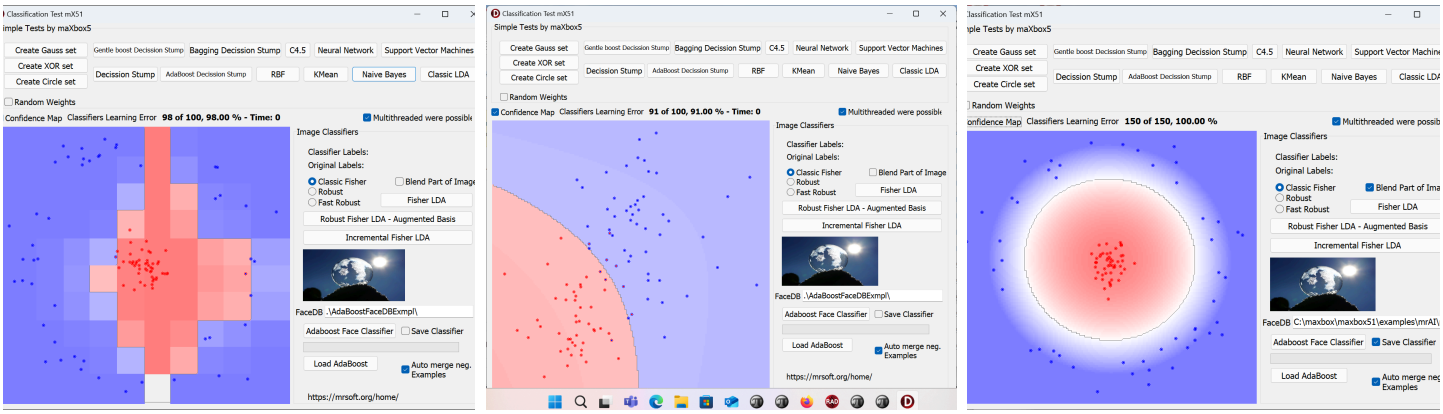
Build with Embarcadero compiler D12.1

The source with precompiled binaries (This library is an extension of the **mrMath, mrAI** and **mrImgUtils** libraries and therefore depending on it!) are on:

https://github.com/maxkleiner/mrai_mx5/tree/master/TestApp (https://github.com/maxkleiner/mrai_mx5/tree/master/TestApp)

The momentum approach has been added to the **neural network learner**. In addition a certain percentage of the training set can now be selected to be a distinct validation set. This functionality has been moved into the base class so it may be used for other custom algorithms as well.

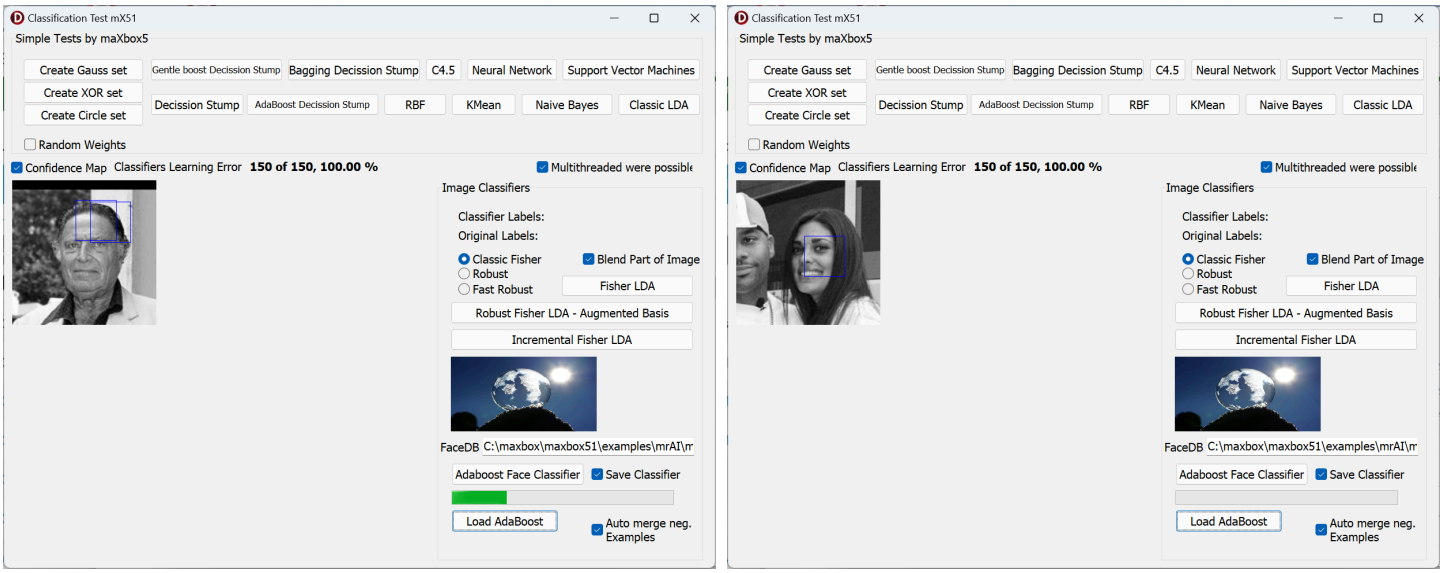
A simple feed forward neural network has also been added to the AI library whic hincludes linear, tanh and exponential neuron activation. For the learning step a simple backpropagation aglorithm has been added. The library now utilizes the new random engine provided by the mrMath library and also a confidence map:



Classifiers with confidence map

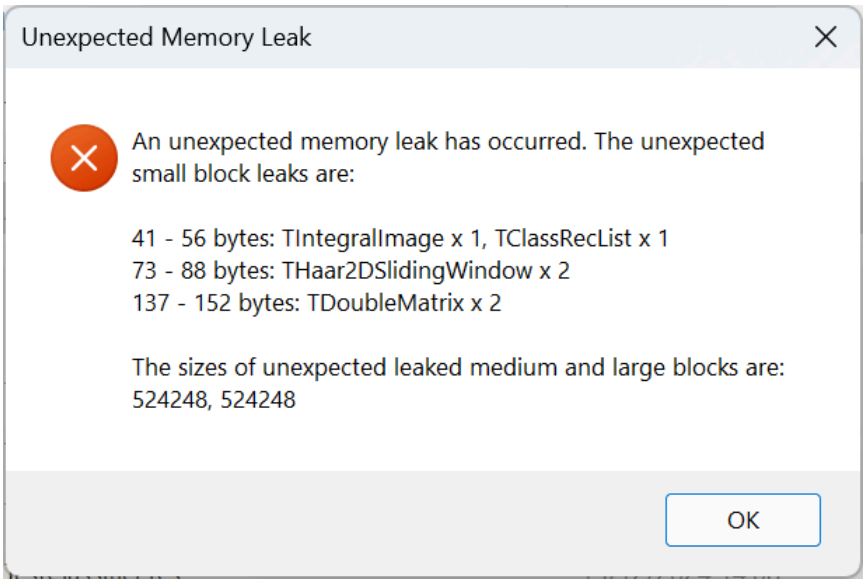
The kmeans classifier features normal or median update steps as well as kmeans++ initial center search. The Radial Basis Classifier features **different Kernels** (Gauss, Quad, Inverse Multiquad, Multiquad) as well as different radial basis extractors. These are randomly selected subset from the learning set or mean/median of the class centers.

A simple version of the Viola Jones Face detection algorithm is also available as unit and app test:



Face Detection Playground

Models can be saved and loaded from files like **haarClassifier21.cls (https://github.com/maxkleiner/mrai_mx5/blob/master/TestApp/haarClassifier21.cls)**. Tested also with memleaks cause this is not very troublesome but if this already used memory has some NAN in it it may happen that the QR, Cholesky, LU and SVD decompositions raise exceptions.



memleak tests

Conclusion: You can build and compile the whole library or start easy with the compiled app on git: **TestClassifier64bit.exe (https://github.com/maxkleiner/mrai_mx5/blob/master/TestApp/TestClassifier64bit.exe)**

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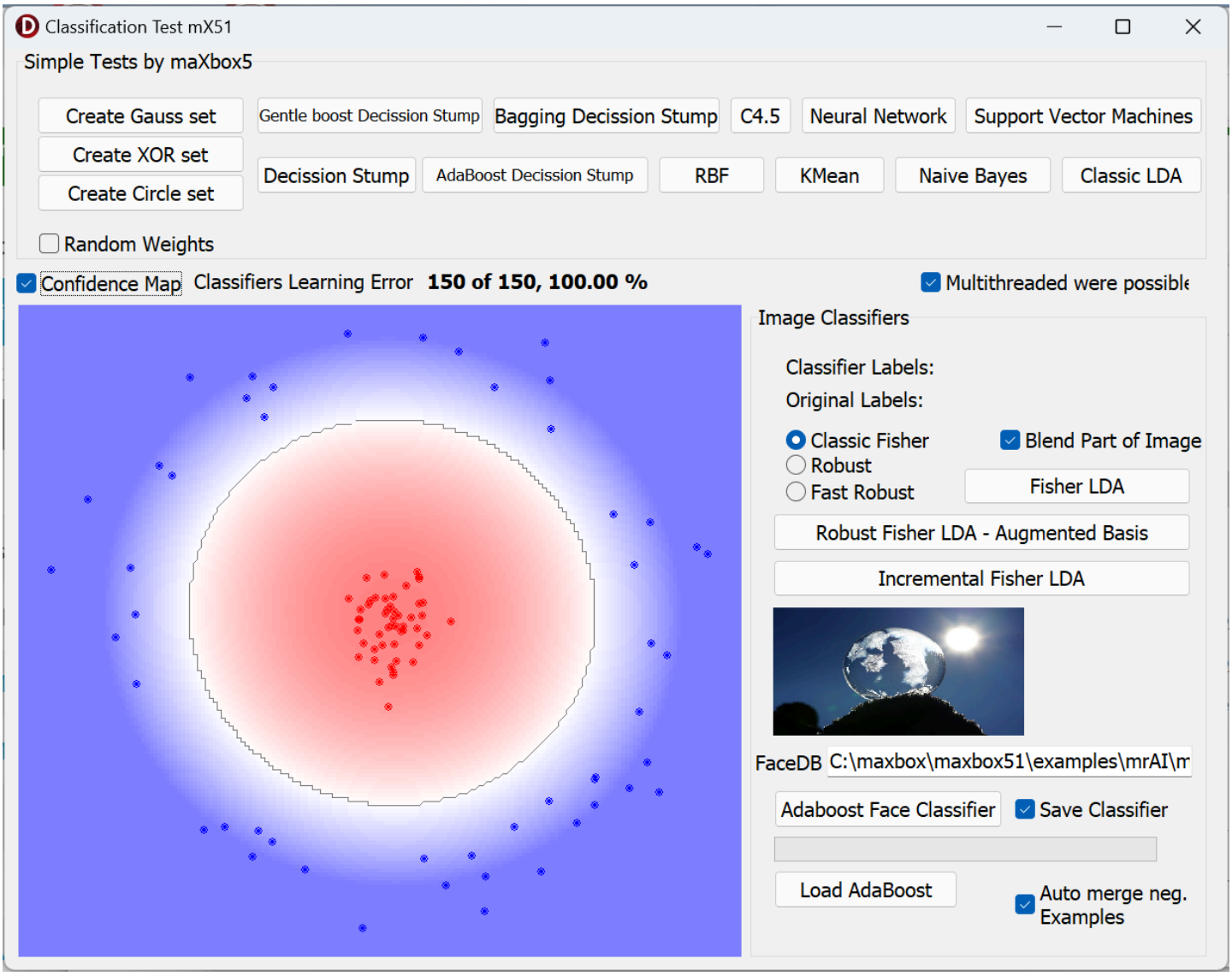
Or build then first download both of these 4 libraries **mrMath**290, **mrMathIDE**, **mrImgUtil**s, **mrAI** and compile the included dpk files. Also add the directories to the library (and or) search paths!



Circle Set Tester mX51

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