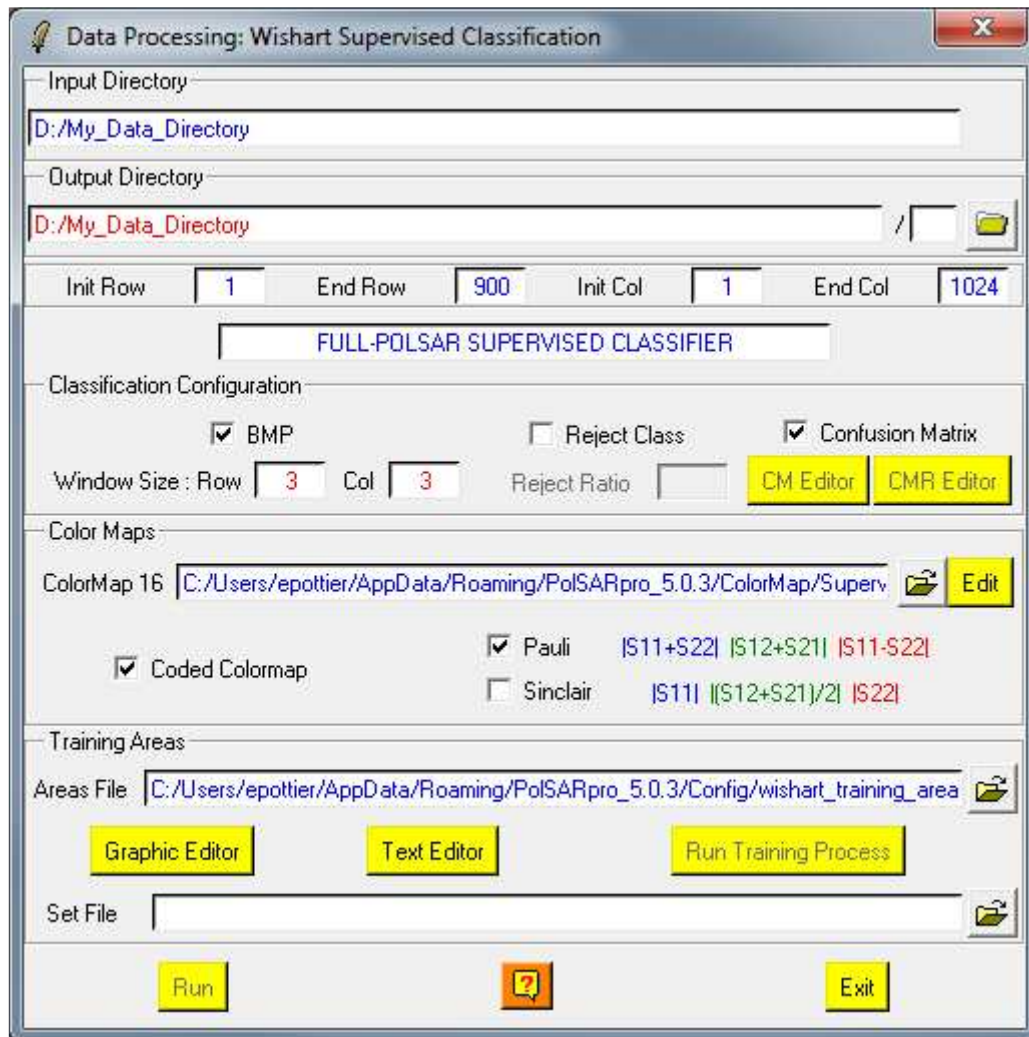


Wishart Supervised Classification



Description:

This program creates binary and bitmap image files resulting from the supervised classification of polarimetric data using Wishart Maximum Likelihood statistics. The supervised Wishart polarimetric classification scheme performs a Maximum Likelihood (ML) statistical classification of a polarimetric data sets based on the multivariate complex Wishart probability density function of second order matrix representations.

In a first step, the classifier "learns" the Wishart statistics of user-defined training areas. The whole data set is then classified by assigning each pixel to the closest class using a Maximum Likelihood decision rule.

Comments:

Parameters written in Red can be modified directly by the user from the keyboard.

Input/Output Arguments:

Input Directory	Indicates the complete location of the considered Main Directory (MD) containing the Sinclair monostatic [S2] matrix data to be classified.
Output Directory	Indicates the location of the processed data output directory. The default value is set automatically to the Main Directory (MD) .

Output Image Number of Rows/Columns:

The output image numbers of rows and columns are initialised to the input data set dimensions.

Users wishing to process a sub-part of the initial image can modify the **Init** and **End** values of the converted images rows and columns.

Note: init and end values have to remain within the range defined by the input image dimensions.

Classification Configuration:

Window Size Data to be decomposed may be processed through an additional filtering procedure consisting of a boxcar filter. Users have then to set the size of the (NxN) sliding window used to compute the local estimate of the average matrix. Users wishing to avoid additional filtering may set N to 1.

Reject Class This supervised classification scheme offers the possibility to reject pixels located, in the data space, at a large distance from any cluster centre. A pixel may be assigned to a reject class if its distance from the closest class verifies the following relation :

Where **d** represents the distance between the considered pixel and the considered class centre, **sigma** denotes the standard deviation of the within-class distance and **r** is a user defined rejection ratio.

Confusion Matrix A processing option enables the creation of Confusion Matrix text files that can be edited, once the classification algorithm is terminated.

The Confusion Matrix output files are:

- MD / confusion_matrix_X.txt
- MD / confusion_matrix_rej_X.txt

The variable **X** indicates the window size of the eventual additional filtering performed prior to data classification.

ColorMap:

The colour coding of the bitmap output files is realized by the way of a 16 element colormap initialised with arbitrary values. Users have the possibility to modify the elements of the colormap in an interactive way.

There exists also the possibility to create an automatic **Coded Colormap** obtained from an RGB colour coding of each Class Feature Vectors.

Training Areas:

Training areas may be defined by the way of a graphic interface or a text editor. The graphic interface permits to delimitate areas by defining regions of interest on a visual representation of the data to be classified.

Note: See the Training Graphic Editor Help file for a precise description of all the different functionalities.

Users wishing to define training areas from specific coordinates may first save a temporary training_areas.txt and modify it according to their needs using the training area text editor.

Training Process:

Once training areas are defined, the training process can start. The program collects the coordinates of each training area and computes each class centre matrix.

The training output files are :

- MD / training_cluster_set.bin
- MD / training_cluster_set.bmp : Indicates the location over the processed image and the colour coding of each training class.

Output Files:

The classification output files are :

- MD / supervised_class_X.bin : Classification binary output file.
- MD / supervised_class_X.bmp : Classification bitmap output file.
- MD / classified_cluster_set_X.bmp : Cluster set classification bitmap output file.

and:

- MD / confusion_matrix_X.txt
- MD / confusion_matrix_rej_X.txt

The variable **X** indicates the window size of the eventual additional filtering performed prior to data classification.

Wishart Supervised Classification Procedure Steps:

- **1** : Select the Output Directory.
- **2** : Select the Output Image Number of Rows/Columns.

- **3** : Select BMP creation files, Reject Class and Confusion Matrix.
[Note: BMP and Confusion Matrix are selected by default.](#)
 - **4** : Enter the Window Size and the Reject Ration Coefficient.
(if Reject Class option is selected)
 - **5** : Edit the ColorMap and choose the colours associated to the different classes.
 - **6** : Select (or not) the Coded ColorMap option.
 - **7** : Enter the name of the Training Areas list text file.
The default output file name is set to [./ Config / training_areas.txt](#).
 - **8** : Run Graphic Editor to define graphically the Areas of Interest (AoI).
or run Text Editor to enter the coordinates of the Areas of Interest (AoI)
in the Training Areas text file.
 - **9** : Run Training Process. This program will define the training clusters
centres from the selected Areas of Interest (AoI).
 - **10** : Run the Wishart Supervised Classification procedure.
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