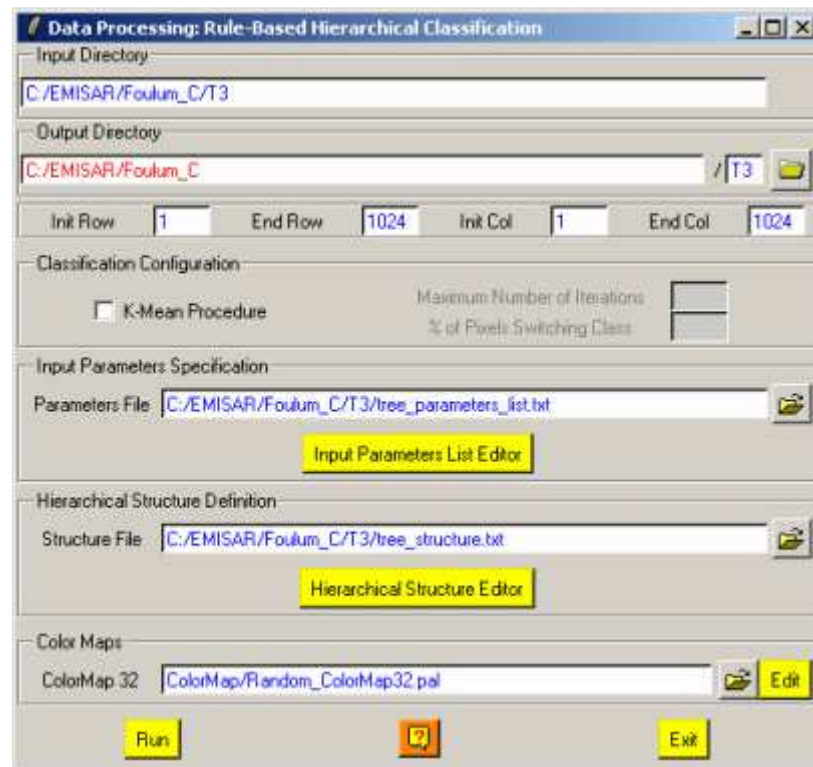


Hierarchical Supervised Classification



Description:

This program creates binary and bitmap image files resulting from the segmentation of polarimetric data using a Hierarchical Unsupervised Classification based on a rule-based tree-structure.

Different approaches have been used to classify SAR data, e.g. the maximum likelihood approach using extracted polarimetric features, the maximum likelihood approach using the Wishart distribution, or the unsupervised approach using polarimetric decomposition. A very important class of algorithms is the knowledge-based approaches (see H. Skriver publications). Here, generic characteristics of different cover types are derived by combining physical reasoning with the available empirical evidence. These are then used to define classification rules. Because of their emphasis on the physical content of the SAR data they attempt to generate robust, widely applicable methods, which are nonetheless capable of taking local conditions into account.

The hierarchical decision trees method uses a sequence of decisions to progressively refine the labelling given to a given pixel or field. Broad classes are distinguished first, with each subsequent step creating new subclasses that are more and more specific. Typically, such approaches are based on some physical understanding of the scattering processes giving rise to the polarimetric signatures, and using this to isolate the most relevant features for identifying different cover types.

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 containing the data to be classified.
Output Directory	Indicates the location of the processed data output directory. The default value is set automatically to : Main Directory .

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:

K-Mean procedure	In order to adapt the classification scheme to different regions, to different time of the year for the acquisitions, to different weather conditions, to calibration differences between different systems, etc., the decision boundaries at the different levels of the hierarchical classification scheme are adjusted using a standard K-Mean classification method
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The segmentation termination criterion consists of a logical combination of the two following conditions. The iterative k-mean clustering procedure is stopped if :

% of Pixels Switching Class	A sufficiently low percentage of pixels switch class from one iteration to the other. (The default value is set automatically to 10%)
Maximum Number of Iterations	The number of iterations reaches a maximum value. (The default value is set automatically to 10)

Input Parameters Specification:

The knowledge-based classification scheme uses polarimetric parameters normally derived from the covariance or coherency matrix. Important features are the backscatter coefficients and ratios between polarimetric channels both based on the original linear polarisations but also features involving polarisation synthesis (circular, linear +45°...).

These parameters variables used as id's in the Hierarchical Structure definition are defined by the way of a specific interface, launched by clicking on the button **Input Parameters List Editor**.



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

Output Files:

Each classification procedures creates output binary files and the corresponding optional bitmap image files.

Classification binary output files :

- [MD / tree_class.bin](#)
- [MD / kmeans_tree_class.bin](#) (if *K-Mean Procedure* selected)

Classification bitmap output files :

- [MD / tree_class.bmp](#)
 - [MD / kmeans_tree_class.bmp](#) (if *K-Mean Procedure* selected)
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