

User manual

SEATH_GUI

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Introduction:

Object-based image classification is a promising methodology as it is close to human perception. A typical object-based classification system starts with segmenting the image into smaller homogeneous regions (or image objects). These objects correspond to approximations of real-world objects. Every object is characterized by several features defined based on layer values, texture, shape and context of the object. With a few input samples for every class, it is possible to identify which of the features can be utilized to make rulebases (Nussbaum et al, 2005, Marpu et al, 2008). The Jeffries-Matusita distance, J (or the Bhattacharya distance, B) calculates the statistical measure of separability for ever class combination and for every feature under test. The values of J lie between 0 and 2. If the value of J is close to 2, the feature has the best separability and can be used to distinguish the classes under test. Moreover, We can also identify an approximate threshold of separation between the two classes based on Baye's rule

References:

Marpu, P.R., Nussbaum S., Niemeyer I. & R. Gloaguen (2008): A Procedure for automatic object-based classification. In: Blaschke, T., Lang, S. & G. Hay (ed.) (2008): *Object-Based Image Analysis Spatial Concepts for Knowledge-Driven Remote Sensing Applications*. Series: Lecture Notes in Geoinformation and Cartography. Springer, Berlin

S.Nussbaum,I.Niemeyer,M.J.Canty (2005): Feature Recognition in the context of automated object-oriented Analysis of Remote Sensing Data monitoring the Iranian Nuclear Sites, SPIE 2005 Optics/Photonics in security and Defence

Software:

The Photogrammetry/Geomonitoring Working Group at Freiberg University of Mining and Technology (TU Bergakademie Freiberg) holds all rights concerning the software. The software is free to distribute and works only with the freely available IDL Virtual Machine. The IDL VM can be downloaded from http://www.creaso.com/english/12_swvis/11_idl/idlvm.htm

The GUI to visualise the separability and thresholds is programmed and compiled in the IDL version 6.1 environment. IDL is a commercial integrated software development environment and is a product of ITT visual information solutions.

Usage:

There are two versions of the program

- 1) SEATH_GUI, which only displays the results
- 2) SEATH_GUI_1, which not only displays the results but also stores the results in *.csv files for every class combination

The software is exclusively made to deal with ObjectStatistics file provided by the Definiens software.

The process sequence is in the following order:

- 1) Segment the image.
- 2) Create the class hierarchy
- 3) Collect samples by using the manual classification option in Definiens software
- 4) Using the process algorithm 'Export Object statistics', export the statistics of the samples for all the classes to be tested.
 - a) Do not select the parent classes.
 - b) Select the features you want to test for separability
- 5) The ObjectStatistics.csv file is the input to the SEATH_GUI program.
- 6) The results in the GUI are sorted with the best feature at the top.

The screenshot displays the SEATH_GUI software interface. On the left, a grid of 18 small tables shows feature selection results for various classes: background, buildings1, buildings2, buildings3, Road1, Road2, Road3, Road4, Road5, Road6, Road7, Road8, Road9, Road10, Road11, Road12, Road13, Road14, Road15, Road16, Road17, Road18, Road19, Road20, Road21, Road22, Road23, Road24, Road25, Road26, Road27, Road28, Road29, Road30, Road31, Road32, Road33, Road34, Road35, Road36, Road37, Road38, Road39, Road40, Road41, Road42, Road43, Road44, Road45, Road46, Road47, Road48, Road49, Road50, Road51, Road52, Road53, Road54, Road55, Road56, Road57, Road58, Road59, Road60, Road61, Road62, Road63, Road64, Road65, Road66, Road67, Road68, Road69, Road70, Road71, Road72, Road73, Road74, Road75, Road76, Road77, Road78, Road79, Road80, Road81, Road82, Road83, Road84, Road85, Road86, Road87, Road88, Road89, Road90, Road91, Road92, Road93, Road94, Road95, Road96, Road97, Road98, Road99, Road100. On the right, a larger, detailed view of one of these tables is shown, titled 'background buildings1'. This table lists features with their J values, directions, and thresholds.

Features	J	Direction	Threshold
NDVI	1.96345	>	0.0302186
Mean Layer 1	1.87770	<	566.825
Mean Layer 2	1.65904	<	965.472
Standard devic	1.57426	<	12.9716

Features	J	Direction	Threshold
Mean Layer 2	1.96662	<	1006.24
Mean Layer 3	1.96616	<	893.308
Brightness	1.96486	<	859.841
GLCM Mean (c	1.96475	<	106.860

Features	J	Direction	Threshold
NDVI	1.99863	>	0.0296768
Mean Layer 4	1.62293	>	721.319
Mean Layer 3	1.42303	>	682.033
Max. diff.	1.42206	>	0.477524