Remote land surve

Image classification

Unguided classification in IDRISI

Module**CLUSTER**

(Image Processing / Hard Classifiers)

• uses the technique of histogram peaks

resulting image

choice of algorithm: broad (prominent peaks only) fine (all peaks)

CLUSTER - unsupervised classifica	tion		
Bands to be processed (max = 7)			
		Num 1	ber of files :
bands for	\langle		
classification		and the second	layer group
Output image :			
Grey levels :			6
Saturation percentage :			1.0
Generalization level	C Fine		
Clustering rule Clusters Clusters Clusters Clusters Clusters Clusters		Percent	1.0
ОК	Close	Help	1



Module**ISOCLUST**

(Image Processing / Hard Classifiers)

- ISODATA algorithm concept
- uses minimal to classify pixels into classes spectral distance

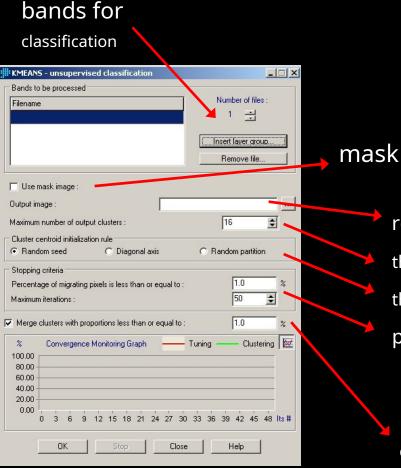
ands to be processed (max = 7)	
bands for	Number of files:
classification	Insert layer group
	Remove file

 ISOCLUST - iterative self-organizing cluster analysis		
Number of iterations :		number of calculation iterations number
Number of clusters desired :		of clusters (classes) to create
Minimum sample size per class (pixels) :		minimum number of training
Output image :		pixels
OK Close Help	lp	
		resulting image



Module **KMEANS**

(Image Processing / Hard Classifiers)



• calculation of the average vectors of the clusters and their comparison with the classified pixels

resulting image

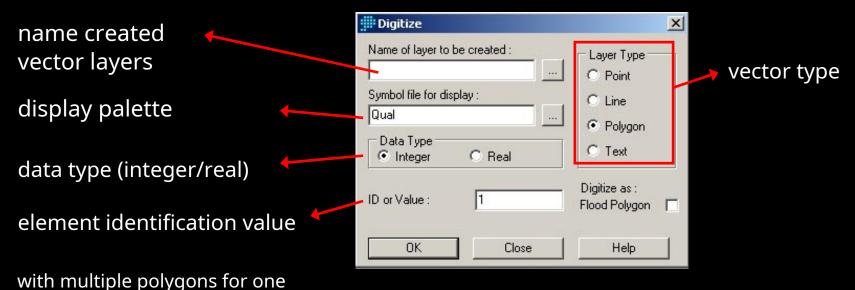
the number of clusters (clusters, classes) to create the method of distribution of the initial clusters process termination criteria - max % of migrating pixels - max. number of iterations

choosing to merge clusters below the threshold

Managed classification in IDRISI

Creation of training sets digitizing from the screen





class, all these polygons need to be assigned the same ID



creation of signatures – moduleMAKESIG (Image Processing / Signature Development)

MAKESIG - signature extraction Type of training site file • Vector • Image	the type of file defining the training set and its and its
Vector file defining training sites :	name
Enter signature file names Bands to be processed (max = 7) Filename Number of files: 1	 naming of individual signatures (classes)
Insert layer group	insertion of bands from which signatures are to be calculated
Minimum sample size per class (pixels) : 10	the minimum number of training pixels for each class



Comparison of signatures

Idris moduleSIGCOMP

(Image Processing / Signature Development)

SIGCOMP - signature comparison chart	X	
Signature files		
Filename	Number of files:	
	1 🗄	
	Insert signature group	incorting a cignature file
		inserting a signature file
	Remove file	
Display type		
Minimum and maximum		
C Mean 🗕		choice of graph type
C Minimum, maximum and mean		5 1 91
OK Close	Help	

Histogram of signatures - moduleHISTO



Idris moduleMAXLIKE

options for a priori setting of probabilities for each class

MAXLIKE - maxim	um likelihood classification				
	obabilities for each signature bability value for each signature		ability image for each signature ue or an image for each signature		
Signatures to use in c	lassification: Probability value/image Value Value	Probability definition 0.5 0.5	Number of files: 2 * Insert signature grou remove file	P	insertion groups signatures
Proportion to exclude: © 0% (classify all pixe © 1% Output image:		C 5% C Chi squared value:			determination of % pixels which can remain
	ОК	Close Help			not classified

the name of the resulting file

Other classification modules in IDRISI

- PIPED– rectangle classifier
- MINDIST minimum distance classifier

Soft classifiers

- they do not create a definitive classification of pixels into classes
- the result is several images (according to the number of signatures) showing the probabilities of each pixel belonging to each class
- Idrisi modules:BAYCLASS,BELCLASS



Literature

• Eastman, JR 2009: Idrisi TAIGA Guide to GIS and Image Processing, Clark Labs, Worcester, MA

Remote land surve

Classification accuracy



Rating classification

- Error matrix– compares the relationship between reference data and classification results for all classes
- Kappa coefficient– compares the resulting classification with the classification created by a purely random process of assigning pixels to classes
 - a value of 0.9 means that we have avoided 90% of the errors that would have been caused by random assignment



Error matrix

• errors of omission(omission error) - "forest" pixels are classified elsewhere (columns)

- errors from incorrect classification(commission error) pixels representing a different surface (lines) are included in the "forest" class
- accuracy from the user's point of view(user's accuracy) the probability with which a pixel assigned to a certain class actually represents it
- accuracy from the point of view of the processor(producer's accuracy)
 = number of correct ears. pixels / number of pixels used for testing the given class



Calculation of the error matrix

average accuracy

classification of all classes: 110+90+55+30 / 301 = 95%

	Reference data							
Clas	class	forest	field	water	houses	Σ		
Classification	<u>forest</u>	110	0	5	0	115		
ition	field	10	90	0	0	100		
	water	0	0	55	0	55		
	houses	1	0	0	30	31		
	Σ	121	90	60	30	301		



Error of omission

- =11/**121**=9%
- sum of pixels in the column off the main diagonal / number of reference data pixels

	Reference data							
Clas	class	forest	field	water	houses	Σ		
Classification	<u>forest</u>	110	0	5	0	115		
tion	field	10	90	0	0	100		
	water	0	0	55	0	55		
	houses	1	0	0	30	31		
	Σ	121	90	60	30	301		



Misclassification error

- =5/121=4%
- sum of pixels in the row outside the main diagonal / number of reference data pixels

	Reference data							
Clas	class	forest	field	water	houses	Σ		
Classification	<u>forest</u>	110	0	5	0	115		
ition	field	10	90	0	0	100		
	water	0	0	55	0	55		
	houses	1	0	0	30	31		
	Σ	121	90	60	30	301		



Accuracy from the user's point of view

- =110/**115**= 96%
- number of correctly classified pixels / total number of pixels assigned to the class

	Reference data							
Clas	class	forest	field	water	houses	Σ		
lassification	<u>forest</u>	110	0	5	0	115		
tion	field	10	90	0	0	100		
	water	0	0	55	0	55		
	houses	1	0	0	30	31		
	Σ	121	90	60	30	301		



Accuracy from the point of view of the processor

- =110/121=91%
- number of correct spikes. pixels / number of pixels used for testing the given class

	Reference data							
Class	class	forest	field	water	houses	Σ		
lassification	forest	110	0	5	0	115		
tion	field	10	90	0	0	100		
	water	0	0	55	0	55		
	houses	1	0	0	30	31		
	Σ	121	90	60	30	301		



Literature

- Campbell, JB 1996: Introduction to Remote Sensing, Taylor and Francis, London
- Dobrovolný, P. 1998: Remote sensing of the Earth, digital image processing, Masaryk University, Brno