

likelihood

keys:	[from]	<number>	source picture (1 or more layers)
	[to]	<number>	output picture (single layer)
	with	<number>	picture containing training statistics
	stride	<number>	sampling interval across and down the picture
	position	<x>, <y>	position, offset of subregion
	size	<x>, <y>	dimensions of subregion
	probability	<n1>...<n9>	the <i>a priori</i> probability of a class
	threshold	<n1>...<n9>	the threshold percentage to apply to each class
options:	left/right, top/bottom		position of subregion

The **likelihood** command classifies a picture using the *maximum likelihood* method. Use the **likelihood** command in *Remote Sensing* applications.

Examples

```
likelihood 1 2 with 3
```

This command classifies picture 1 using the training data contained in picture 3 and sends the output to picture 2.

```
likelihood 1 2 with 3 probability .1, .05, .50
```

This command performs the same actions as the above example and also assigns *a priori* probabilities to the three classes.

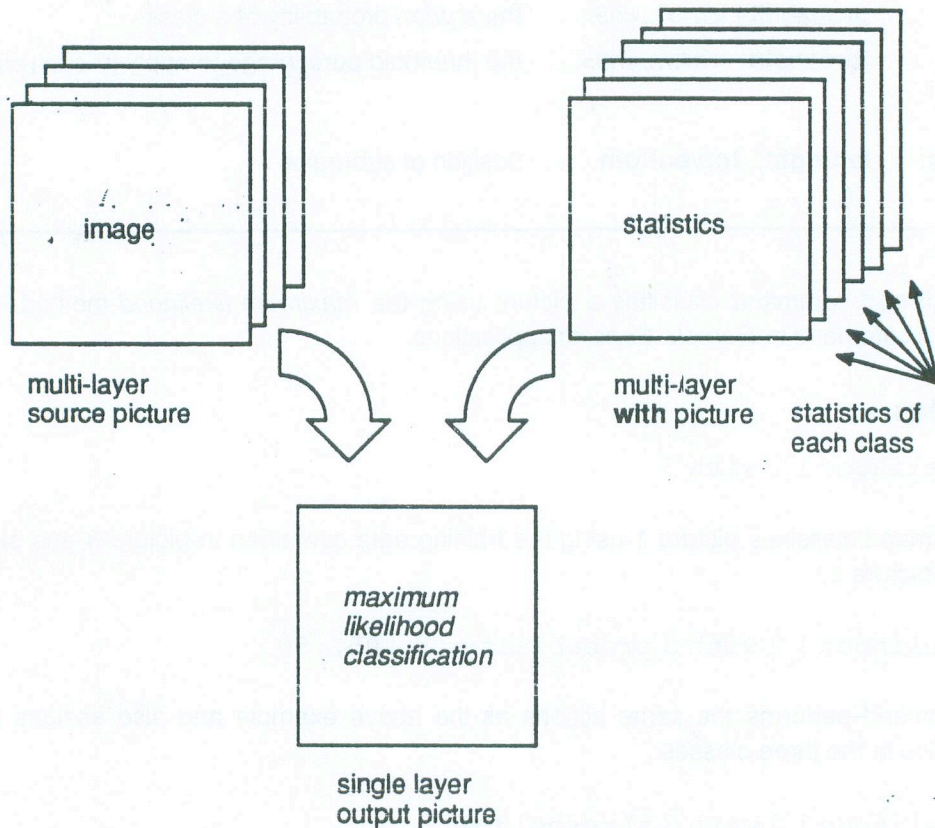
```
likelihood 1 2 with 3 threshold 90
```

This command performs the same action as the first command example and also assigns a threshold of 90% to each class. This means that 90% of the pixels within each class are classified.

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Description

This command performs a maximum likelihood classification of the source image based upon the statistics given in the **with** picture. The **with** picture, which is multi-layer, is the output of the **learn** or **covariance** commands. Each layer of the **with** picture contains the statistics of one class. Classes run from zero, indicating unclassified, to n , where n is the number of layers in the **with** picture. Note that the number of classes that can be processed depends upon the size of the Semper row buffer and on the number of layers in the source picture.



By default, all classes are assumed to have an equal probability, that is, are equiprobable. You can specify the *a priori* probability of a class using the **probability** key. The sum of the probabilities must be less than or equal to 1.0; allowing a probability of elements being unclassified. If you specify one probability, then you must give the probabilities of all classes.

Use the **threshold** key to specify the percentage of pixels within a class that are to be classified (**threshold** assumes that the classes are normally distributed). When you apply a threshold percentage (in the range 1 to 100) some pixels may remain unclassified and are indicated in the output picture by a zero value. If you omit the **threshold** key all pixels in the source picture are classified.

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Normally the number of thresholds should be the same as the number of layers (classes) in the **with** picture, but if only one threshold value is given then it is applied to all classes. In this way, you can perform classifications that involve more than nine regions with a threshold applied. If you specify more than one threshold value then the number of thresholds must agree with the number of classes, as is the case for probabilities.

By default, the output picture has the same size (number of rows and columns) as the source picture. You can alter this by using the **size** and **position** keys to specify a subregion. You can also use the **stride** key to specify the step across and down the picture, allowing a fast classification of a picture. The **stride** key defaults to a value of 1 so that the whole picture is classified.

You can define a subregion using the standard subregion keys and options, **size**, **position**, **left/right** etc. For further detail of these keys and options, refer to *Appendix C, Semper Keys and Options*.

It is possible for the **likelihood** command to fail before classification if any of the class covariance matrices are singular (that is, have no inverse). This is most likely to arise if insufficient pixels have been used in the training region (see **learn**).

Notes

see also: **covariance, learn**

Defaults and Ranges

keys/options	defaults	range
[from]	current picture, held in the variable <i>select</i>	valid picture number
[to]	source picture	valid picture number
with	<i>none</i>	valid picture number
stride	stride 1	positive integer
position	position 0,0	within bounds of picture (integers)
size	whole picture	less than or equal to the size of the picture (integers)
probability	<i>none</i>	real number in range 0 to 1
threshold	all pictures are classified	integer in range 1 to 100