

## Semper 6 Command Reference

### pct

<b>keys:</b>	<b>[from]</b>	<number>	source picture (must be multi-layer)
	<b>[to]</b>	<number>	output picture containing the transformed image
	<b>covariance</b>	<number>	picture containing the covariance matrix
	<b>eigen</b>	<number>	picture used to store the eigenvalues and eigenvectors
	<b>position</b>	<x>, <y>	position, offset of subregion
	<b>size</b>	<x>, <y>	dimensions of subregion
<b>options:</b>	<b>hotelling</b>		perform a hotelling transform
	<b>inverse</b>		perform an inverse transform
	<b>estimate</b>		estimate the probable range of the output picture in order to rescale the output
	<b>stretch</b>		rescale the output
	<b>left/right, top/bottom</b>		subregion positions

The **pct** command performs a *Principal Component* transform or *Hotelling* transform. Use the **pct** command in *Remote Sensing* applications.

### Examples

```
pct 1 2 covariance 3
```

This command performs a transform of picture 1 to picture 2, using the covariance details stored in picture 3.

```
pct 1 2 covariance 3 eigen 4
```

This command performs the same action as the above command and also stores the eigenmatrix in picture 4.

```
pct 2 5 covariance 3 inverse
```

This command performs an inverse transform from picture 2 to picture 5, using the covariance matrix stored in picture 3.

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#### Description

The **pct** command performs a *Principal Component* transformation (or *Hottelling* transform) used in *Remote Sensing* applications.

**pct** calculates the *forwards hottelling* transform as follows:

$$[o] = [g] * ([i] - [mo])$$

and its *inverse* is:

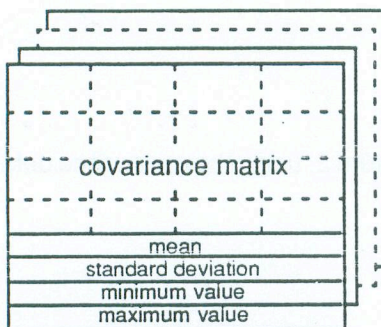
$$[o] = [g]^{-1} * [i] + mo$$

and the default non-mean adjusted transform is:

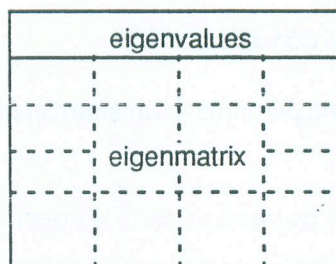
$$[o] = [g] [i]$$

Where  $[i]$  is the input picture,  $[g]$  is the eigenmatrix,  $[o]$  is the output picture and  $[mo]$  is the mean vector of the original picture. By default **pct** perform a *forwards* transform without adjusting the mean value of the picture layers.

The diagram below illustrates the layout of a **covariance** and an **eigenmatrix** picture.



**covariance picture**



**eigenmatrix picture**

Use the **estimate** option to estimate, from layer *minima* and *maxima*, the probable range of the output picture in order to rescale the output. If you do not use **estimate**, the actual layer ranges are determined and used. Estimated ranges are likely to overestimate the output picture range. Note that you can only rescale pictures that have a *Byte* form (see *Appendix A: Picture Types*).

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Use the **stretch** option to rescale output, from a picture in *Byte* form, so that the output covers the range 0 to 255. If you do not specify **stretch** the output picture is shifted so that all elements are positive, but not necessarily in the range 0 to 255. You can only use the **stretch** options on *forwards* transforms.

You must transform at least two layers of the picture. The maximum number of layers is dependent upon the number of columns in the input picture and the length of the Semper row buffers. Type **show system** to see your installation limits. Note that **pct** does not accept *Complex* pictures.

#### Notes

restrictions: *Complex* pictures are faulted  
see also: **covariance, show system**

#### Defaults and Ranges

keys/options	defaults	range
<b>[from]</b>	current picture, held in the variable <i>select</i>	valid picture number
<b>[to]</b>	source picture	valid picture number
<b>covariance</b>	<i>none</i>	valid picture number
<b>eigen</b>	<i>none</i>	valid picture number
<b>position</b>	position 0,0	within bounds of picture (integers)
<b>size</b>	whole picture	within bounds of picture (integers)
<b>hotelling</b>	perform transform without adjusting the mean values of the picture layers	
<b>estimate</b>	actual minimum and maximum layer ranges are used	