Log transform on images

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The dynamic range of an image can be compressed by replacing each pixel value with its logarithm. This has the effect that low intensity pixel values are enhanced. Applying a pixel logarithm operator to an image can be useful in applications where the dynamic range may too large to be displayed on a screen (or to be recorded on a film in the first place).

The mapping function is described as:

$$M(i,j) = c\log(|P(i,j)|)$$

Some people like to add a 1 since zero is not defined for log:

$$M(i,j) = c\log(1 + |P(i,j)|)$$

The scaling constant c is chosen so that the maximum output value is 255:

$$c = \frac{255}{\log(1 + |R|)}$$

where R is the maximum magnitude in the given image.

The degree of compression (which is equivalent to the curvature of the mapping function) can be controlled by adjusting the range of the input values. Since the logarithmic function becomes more linear close to the origin, the compression is smaller for an image containing small input values.

Rescaling input values before doing the log transform will control the compression you'll get in values.

Revision	**Date**	**Description**
1.0	May 22, 2017	Initial draft