graythresh

Global image threshold using Otsu's method

Syntax

```
level = graythresh(I)
[level EM] = graythresh(I)
```

Description

`level = graythresh(I)` computes a global threshold (`level`) that can be used to convert an intensity image to a binary image with `im2bw`. `level` is a normalized intensity value that lies in the range `[0, 1]`.

The `graythresh` function uses Otsu's method, which chooses the threshold to minimize the intraclass variance of the black and white pixels.

Multidimensional arrays are converted automatically to 2-D arrays using `reshape`. The `graythresh` function ignores any nonzero imaginary part of `I`.

`[level EM] = graythresh(I)` returns the effectiveness metric, `EM`, as the second output argument. The effectiveness metric is a value in the range [0 1] that indicates the effectiveness of the thresholding of the input image. The lower bound is attainable only by images having a single gray level, and the upper bound is attainable only by two-valued images.

Class Support

The input image `I` can be of class `uint8`, `uint16`, `int16`, `single`,or `double` and it must be nonsparse. The return value `level` is a double scalar. The effectiveness metric `EM` is a double scalar.

Examples

```
I = imread('coins.png');
level = graythresh(I);
BW = im2bw(I,level);
imshow(BW)
```

Reference

[1] Otsu, N., "A Threshold Selection Method from Gray-Level Histograms," *IEEE Transactions on Systems, Man, and Cybernetics*, Vol. 9, No. 1, 1979, pp. 62-66.