

Lecture 12: Image Thresholding

Part 1: Global Thresholding

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Notes:

- Sample images are available in the images folder of the current directory. (You may need to add images folder into your path.)
- Related lecture: Lecture12 - Image Thresholding
- pdf versions of the .mlx files are also available for those using GNU Octave

```
clearvars; close all; clc;
```

Basic Global Thresholding vs. Optimum Global (Otsu) Thresholding

1. You can use the images in images folder. (fingerprint, rice, coins, otsu)
2. Compare the values of T, T2, and EM.
3. Basic global thresholding may produce different results, at each run.
4. To see the effect of noise, compare the results of noise1 and noise2 images. (noise2 is the smoothed version of noise1)
5. Check the documentations of *imbinarize*, *graythresh*, *otsuthresh* functions

```
% read input image
I = imread('images/fingerprint.png');
if(size(I,3) == 3) % convert to grayscale if needed
    I=rgb2gray(I);
end

% input image and its histogram
subplot(2,2,1), imshow(I), title('Original Image');
subplot(2,2,2), imhist(I), axis square, title('Histogram');
```

Basic Global Thresholding

```
T = gbt(I(:)); % call gbt function (It is not a built-in IPT function, see gbt.m and licence.txt)
title_str = strcat('Basic Global Thresholding (T = ', num2str(round(T)), ' ');
subplot(2,2,3), imshow(imbinarize(I,T/255)), title(title_str); % plot thresholded image
```

Optimum Global Thresholding: Otsu's method

You can directly use $BW = \text{imbinarize}(I)$. BW will be the binary image thresholded with Otsu method.

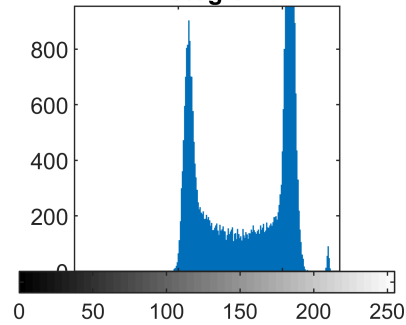
But to obtain the threshold level and effectiveness metric, use *graythresh* or *otsuthresh*.

```
[T2, EM] = graythresh(I);
%[T2, EM] = otsuthresh(imhist(I)); % also check otsuthresh()
kstar = round(T2*255); % optimum threshold value
title_str = strcat('Otsu Thresholding (T = ', num2str(kstar), ', EM = ', num2str(EM), ')');
subplot(2,2,4), imshow(imbinarize(I,T2)), title(title_str);
```

Original Image



Histogram



Basic Global Thresholding (T =162) Otsu Thresholding (T =161, EM =0.88097)

