Assignment A5: Morphological Operations

CS 4640
Spring 2018

Assigned: 6 March 2018

Due: 29 March 2018

For this problem, handin Matlab .m files for the functions described by the headers below (also see p. 733 of the text). Note that one of these is a driver which creates inputs for each function and runs the function on those inputs to obtain the output.

You are also to handin a pdf file (called A4.pdf) reporting on the analysis of the image *00.tif*. Extract the part of the image with text, and provide an RMS error comparison as well as an image difference image of:

1. CS4640_MM_boundary vs. bwmorph's boundary operator
2. CS4640_MM_cc vs. bwlabel
3. CS4640_MM_convhull vs. bwconvhull
4. CS4640_MM_skeleton vs. bwmorph's skeleton operator

Some notes:

- Indent headers correctly (5 spaces indented lines)
- Do not exceed 72 characters per source line
- CS4640_A5_driver: should show that each function works

None of the functions should write to the interpreter, draw, etc.

```
function Bt = CS4640_MM_translate(B,r0,c0,r,c)
% CS4640_MM_translate - translates the origin of B to point z
% On input:
%     B (MxN array): binary image with 1 connected component (labeled
%     1)
%                    whose origin is at (r0,c0) in the image
%     ro (int): row origin value
%     c0 (int): col origin value
%     r (int): destination row (for origin)
%     c (int): destination col (for origin)
% On output:
%     Bt (MxN array): binary image with B translated to (r,c)
% Call:
%     B22 = CS4640_MM_translate(B,23,54,34,35);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%


function Br = CS4640_MM_reflect(B,r0,c0)
% CS4640_MM_reflect - reflects B about its origin
% On input:
%     B (MxN array): binary image with 1 connected component (labeled
%     1)
%                    whose origin is at (r0,c0) in the image
%     ro (int): row origin value
%     c0 (int): col origin value
% On output:
%     Br (MxN array): binary image with B reflected about (r0,c0)
% Call:
%     Br = CS4640_MM_reflect(B,23,54);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%


function Ac = CS4640_MM_complement(A)
```

```
% CS4640_MM_complement - complement of A
% On input:
%     A (MxN array): binary image with 1 connected component (labeled
%     1)
% On output:
%     Ac (MxN array): binary image with complement of A
% Call:
%     Ac = CS4640_MM_complement(A);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%


function AmB = CS4640_MM_diff(A,B)
% CS4640_MM_diff - difference of A and B
% On input:
%     A (MxN array): binary image with 1 connected component (labeled
%     1)
%     B (MxN array): binary image with 1 connected component (labeled
%     1)
% On output:
%     AmB (MxN array): binary image with difference of A and B
% Call:
%     AmB = CS4640_MM_diff(A,B);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%


function Ab = CS4640_MM_boundary(A)
% CS4640_MM_boundary - boundary of A
% On input:
%     A (MxN array): binary image with 1 connected component (labeled
%     1)
% On output:
%     Ab (MxN array): binary image with boundary of A
% Call:
```

```
%     Ab = CS4640_MM_boundary(A);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%


function Acc = CS4640_MM_cc(im)
% CS4640_MM_cc - connected components of im
% On input:
%     im (MxN array): binary image
% On output:
%     Acc (MxN array): binary image with n connected components of im
%                      (labeled 1 to n)
% Call:
%     Ab = CS4640_MM_cc(im);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%


function Ach = CS4640_MM_convhull(A)
% CS4640_MM_convhull - convex hull of component in A
% On input:
%     A (MxN array): binary image with 1 component (labeled 1)
% On output:
%     Ach (MxN array): binary image with convex hull of component A
% Call:
%     Ach = CS4640_MM_convhull(A);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%


function As = CS4640_MM_skeleton(A)
% CS4640_MM_skeleton - skeleton of component A
```

```
% On input:
%     A (MxN array): binary image with 1 component (labeled 1)
% On output:
%     As (MxN array): binary image with skeleton of component A
% Call:
%     As = CS4640_MM_skeleton(A);
% Author:
%     <Your name>
%     UU
%     Spring 2018
%
```

5_driver

```
% CS4640_A5_driver - driver for A5 functions
% On input:
%     N/A
% On output:
%     N/A
% Call:
%     CS4640_A5_driver
% Author:
%     <Your name>
%     UU
%     Spring 2018
%
```