School of Computer Science and Applied Mathematics
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APPM4058A & COMS7238A: Digital Image Processing
Exercise 6

2019-3-13

1 Problems

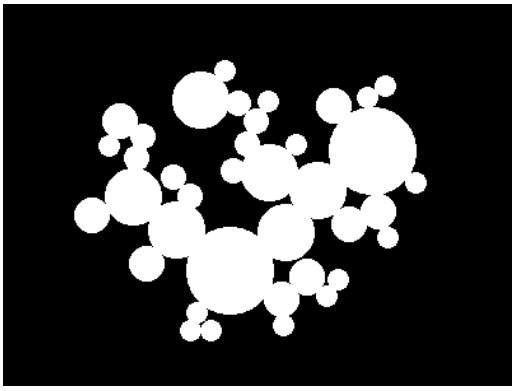


Figure 1: Image ‘circles’

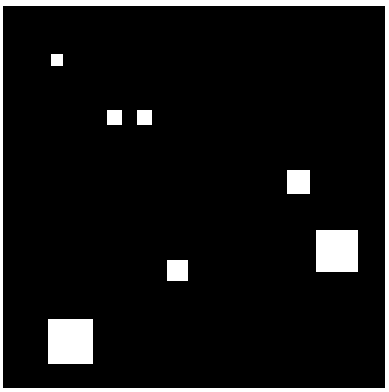
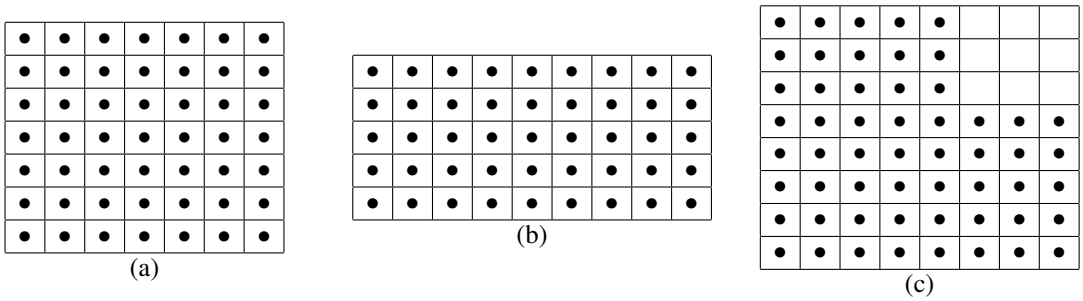


Figure 2: Image ‘small_squares’

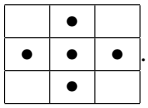
1. Given the image in Figure 1 (‘circles.tif’),
   (a) How would you split the image into disconnected components?
   (b) Try your idea out in Python or Matlab.
   (c) How would you isolate the two biggest circles in the image?
2. Given the image ‘UTK.tif’,
   (a) How would you extract the border of the image?



(a) (b) (c)

Table 1: Images

(b) How would you isolate one of the letters, say ‘K’, in the image?

3. Given the image in Figure 2 (‘samll_sqaures.png’),
   (a) How to find the (approximate) central coordinate of the smallest square, which is a 4×4 square, in the image?
   (b) Implement your approach using Python or Matlab.
   (c) Once the coordinate is identified, how to reconstruct the small square?
4. Using the 3×3 square structuring element, compute the skeletons of
   (a) a 7×7 square, Table 1, (a).
   (b) a 5×9 rectangle, Table 1, (b).
   (c) an L shaped figure formed from a 8×8 square with a 3×3 square taken from a corner, Table 1, (c).
5. Repeat the above question using the cross structuring element. That is,  .
6. Given the image ‘noisy_fingerprint’, perform the following operations.
   (a) Remove the noise in the image using suitable morphological operations.
   (b) Thin the fingerprint ridges using suitable morphological operations.