Thinning Operator

2018/11/20

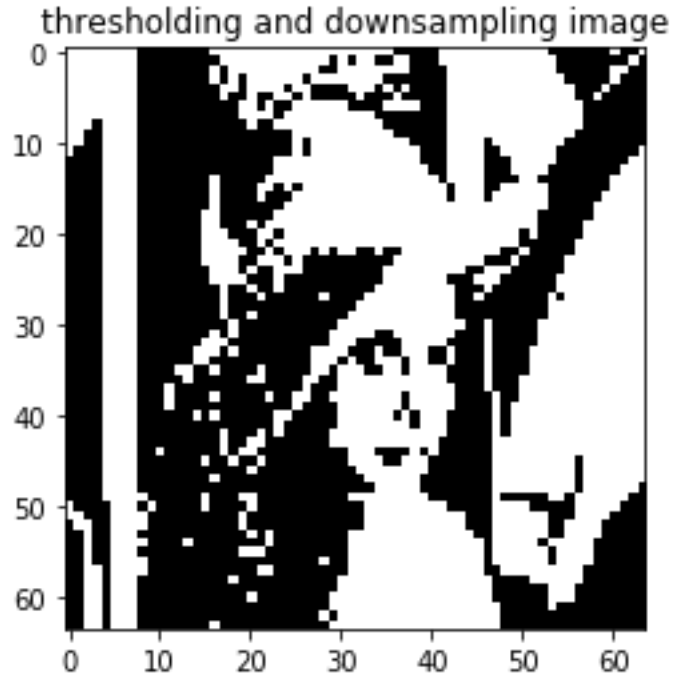# Homework 7

❏ Threshold: 128

    ❏ 1, if pixel > 127

    ❏ 0, if pixel < 128

❏ Downsample image to 64 x 64 pixels

❏ Do thinning operator (4 connected)

Homework 7 - Result

thresholding and downsampling image
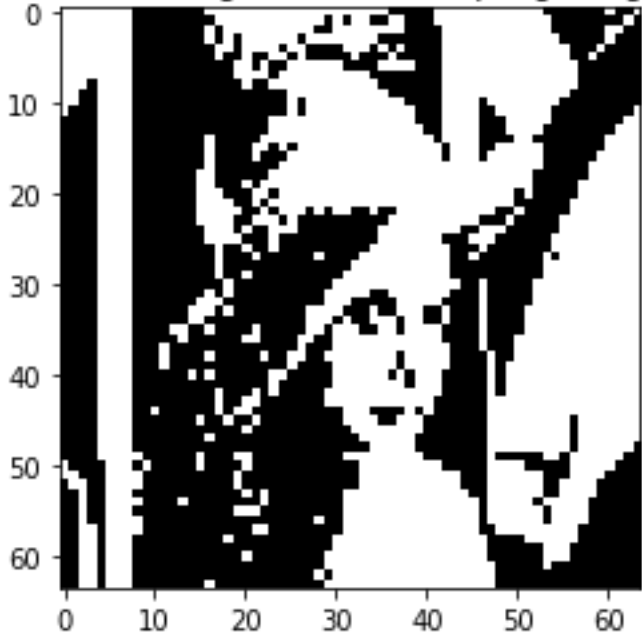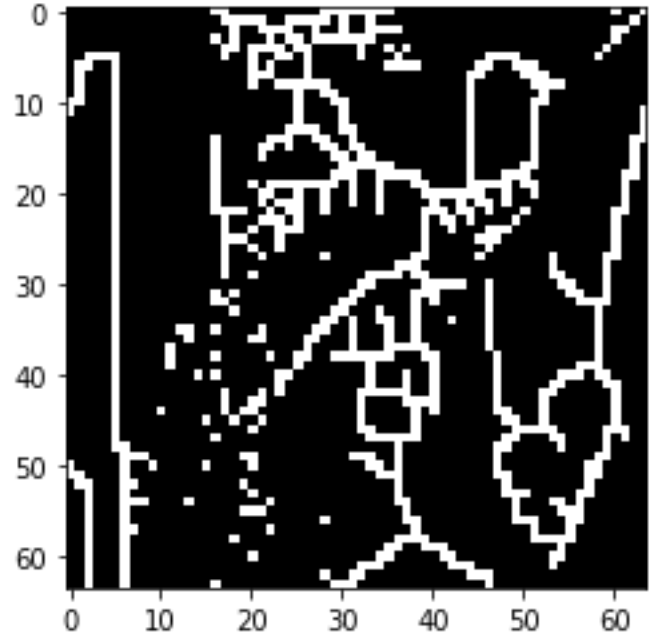
Homework 7 - Result

thresholding and downsampling image

7 iteration

Thinning Operator

➤ Create marked image

    1. Yokoi Operator

    2. Pair Relationship Operator

➤ Connected Shrink Operator

➤ Compare the shrink result with marked image

Pair Relationship Operator

➢ H function: (m="1", means "edge" in Yokoi)

- $h(a, m) = \begin{cases} 1, if\ a = m \\ 0, otherwise \end{cases}$

➢ Output:

- $y = \begin{cases} q, if\ \sum_{n=1}^{4} h(x_n, m) < 1\ or\ x_0 \neq m \\ p, if\ \sum_{n=1}^{4} h(x_n, m) \geq 1\ and\ x_0 = m \end{cases}$

Pair Relationship Operator

original image

*	*			
	*	*		
		*	*	
		*	*	
		*	*	

Yokoi result

1	2			
	2	2		
		2	1	
		1	1	
		1	1	

Pair Relationship Operator

Pair Relationship Operator

Pair Relationship Operator

Pair Relationship Operator

Pair Relationship Operator

Pair Relationship Operator

Pair Relationship Operator

Pair Relationship Operator

marked image

q	q			
	q	q		
		q	p	
		p	p	
		p	p	

original image

*	*			
	*	*		
		*	*	
		*	*	
		*	*	

Connected Shrink Operator

➢ H function: (yokoi corner => "q")

- $h(b, c, d, e) = \begin{cases} 1, if\ b = c\ and\ (d \neq b\ or\ e \neq b) \\ 0, otherwise \end{cases}$

➢ Output:

- $f(a_1, a_2, a_3, a_4, x) = \begin{cases} g, if\ exactly\ one\ of\ a_n = 1, n = 1 \sim 4 \\ x, otherwise \end{cases}$

Thinning Operator

marked image

q	q			
	q	q		
		q	**p**	
		p	**p**	
		p	**p**	

original image

*	*			
	*	*		
		*	*	
		*	*	
		*	*	

Thinning Operator

Thinning Operator

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Thinning Operator

Thinning Operator