

Image

Name	Dharini Baskaran
Identity Key	dhba5060

	Level	Completed
	Beginner	9
	Intermediate	3
	Advanced	0
	Expert	0

Goal	
4722	10
5722	12
Total Completed	
0	

Image

CSCI 5722/4722: Computer Vision

Spring 2024

Dr. Tom Yeh

Dr. Mehdi Moghari

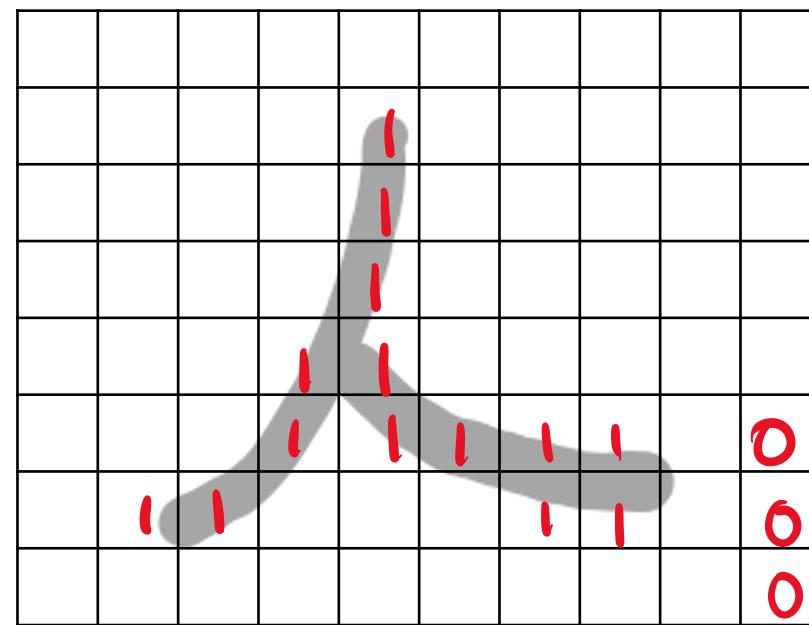
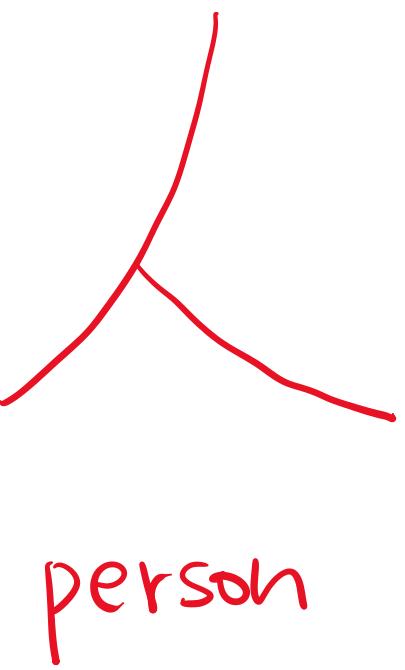
Common Image Types

CSCI 5722/4722 Computer Vision



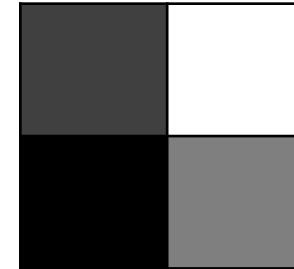
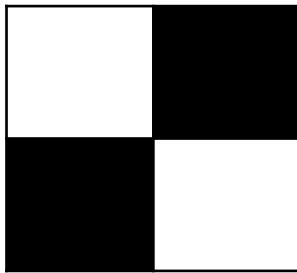
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Binary Image



Blank : 0

Grayscale Image



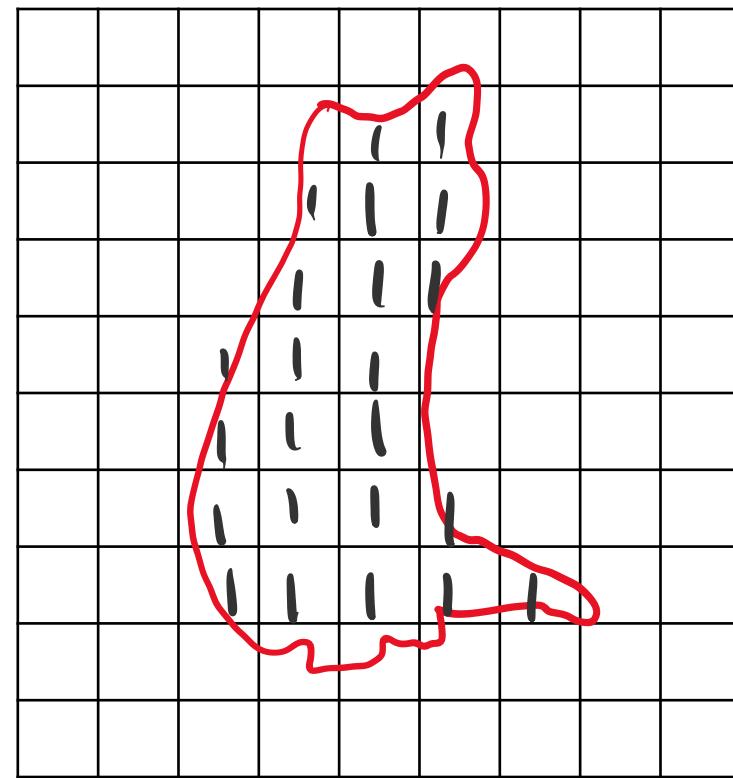
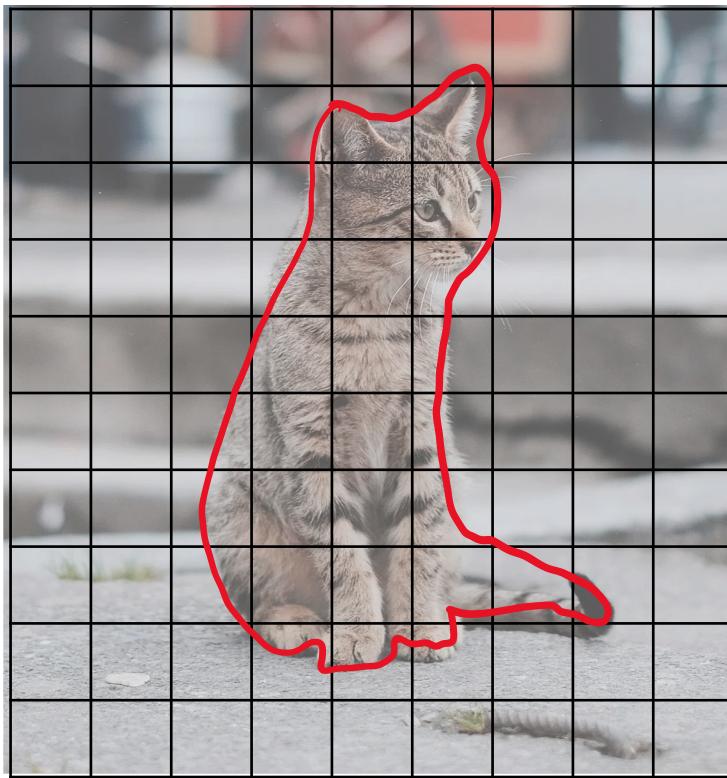
255	0
0	255

128	0
0	128

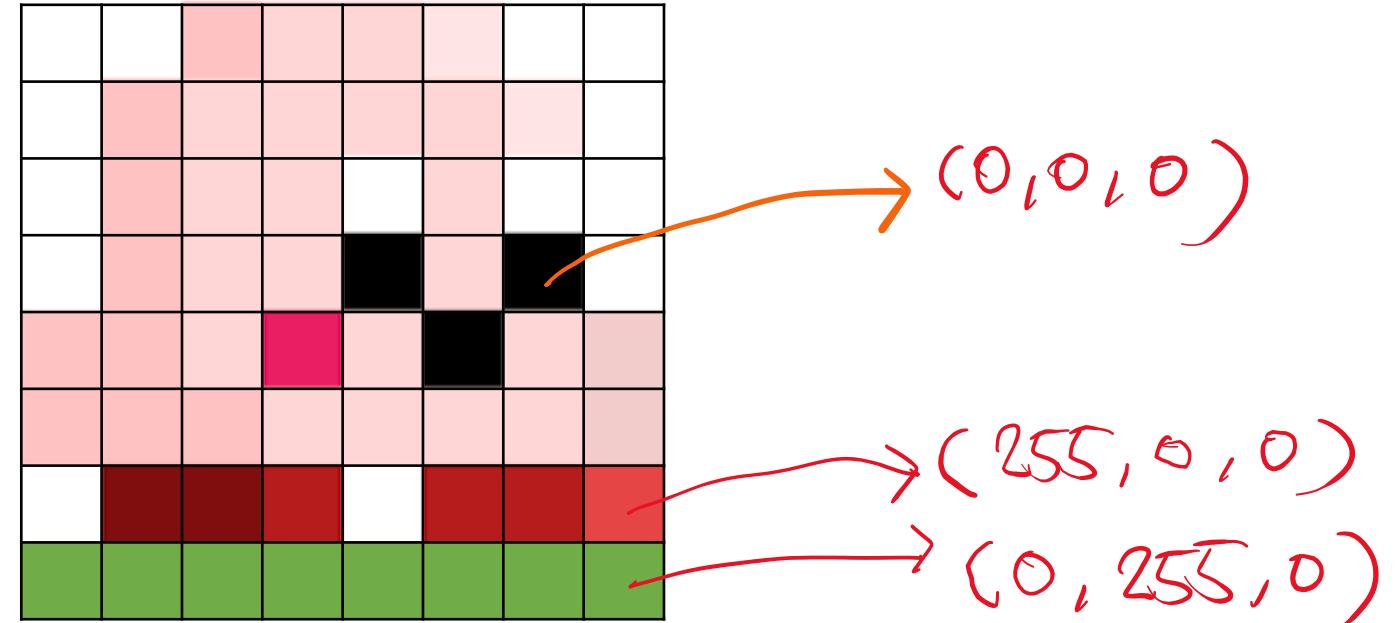
64	255
0	128

Binary Mask

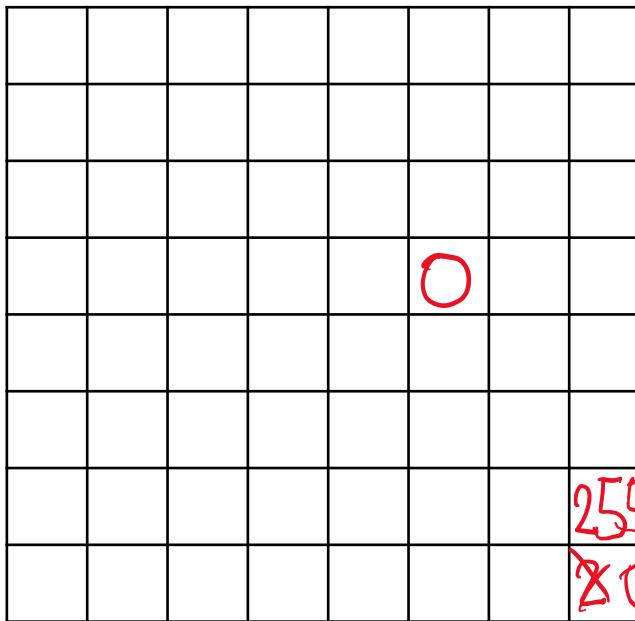
I : *Foreground*



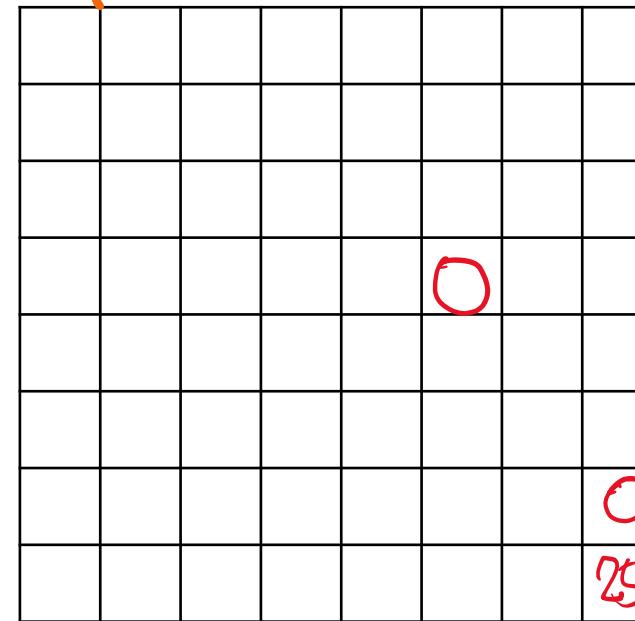
Color Image



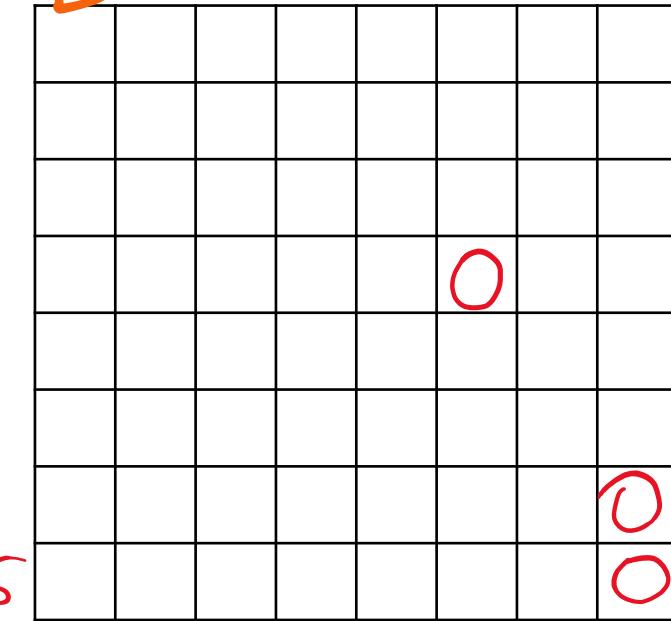
R



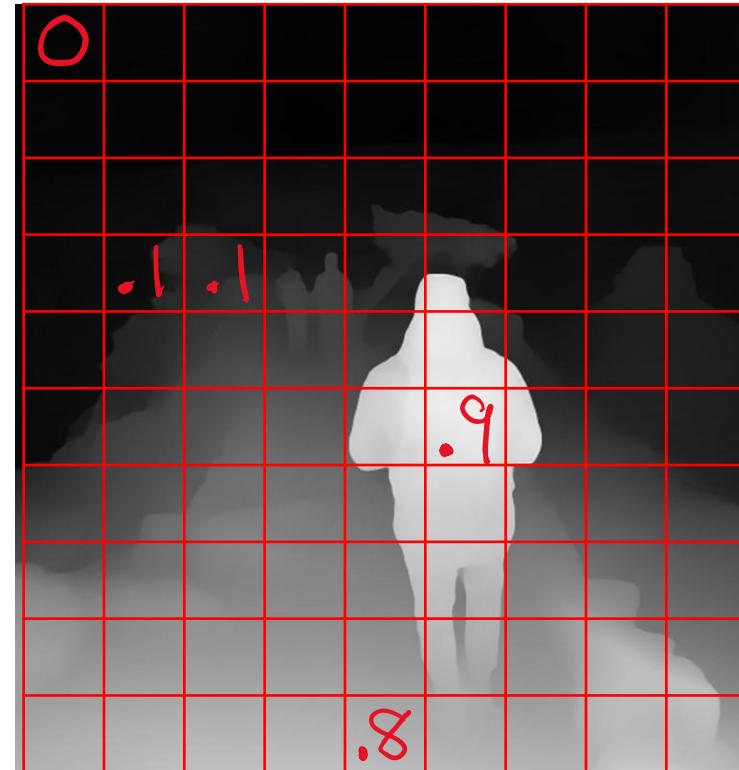
G



B



Depth Map



Depth Map

5: closest, 0: furthest

Template





Depth Map

5: closest, 0: furthest

Template

3	0	0	0	0
3	4	4	4	4
2	3	2	3	3
1	2	2	2	2
1	1	1	2	2

{replace this with your own holiday photo}



Image Function

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Image Function

$$f: \mathbb{R}^2 \rightarrow \mathbb{R}$$

(x, y)

location

I

Intensity

Function to Image

$$f(x, y) = x + y$$

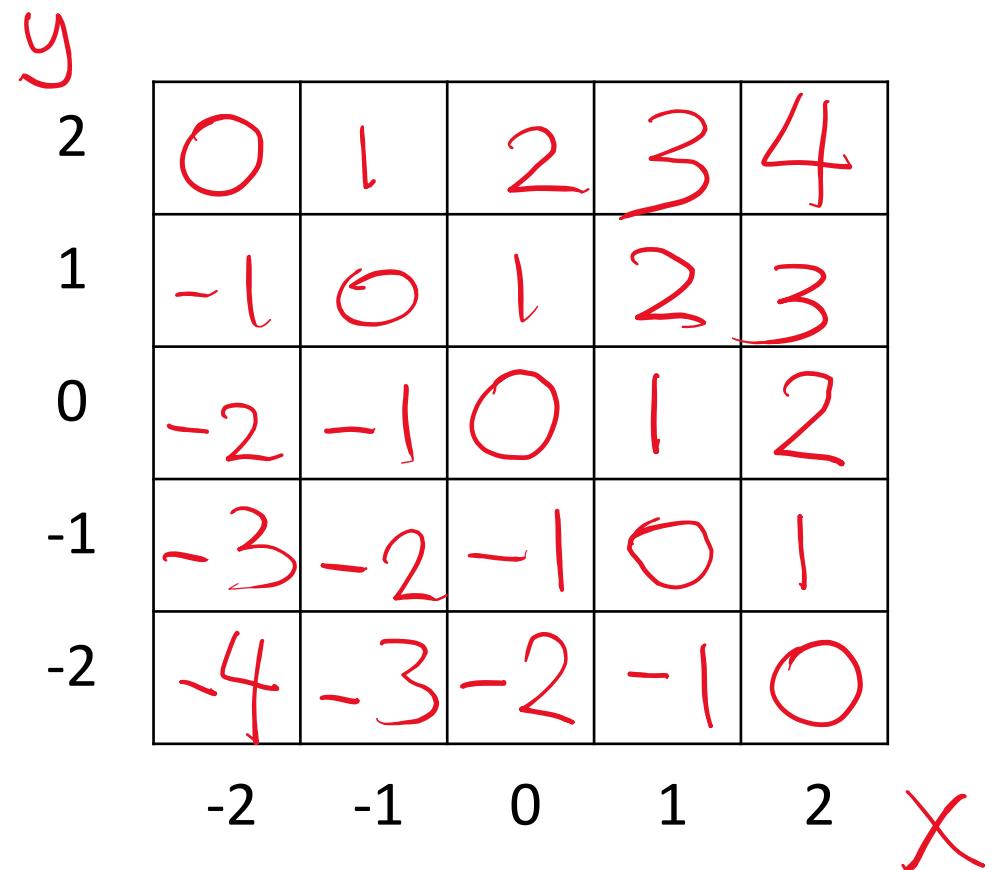
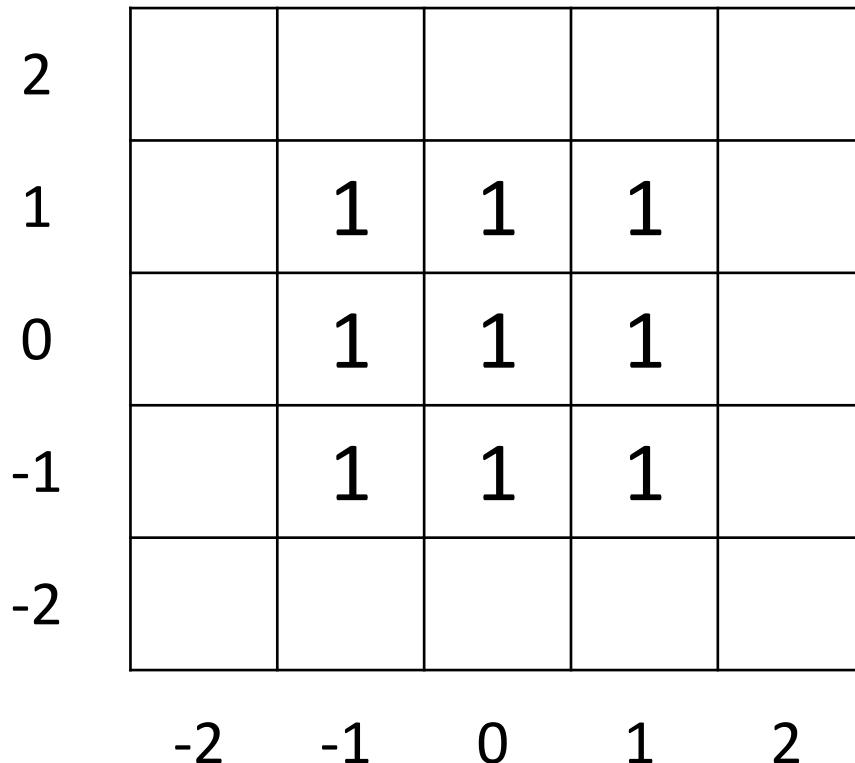


Image to Function



$$f(x, y) = \begin{cases} 1 & \text{if } |x| \leq 1 \\ & \quad \& |y| \leq 1 \\ 0 & \text{otherwise} \end{cases}$$



Function to Image

$$f(x, y) = 2x + y$$

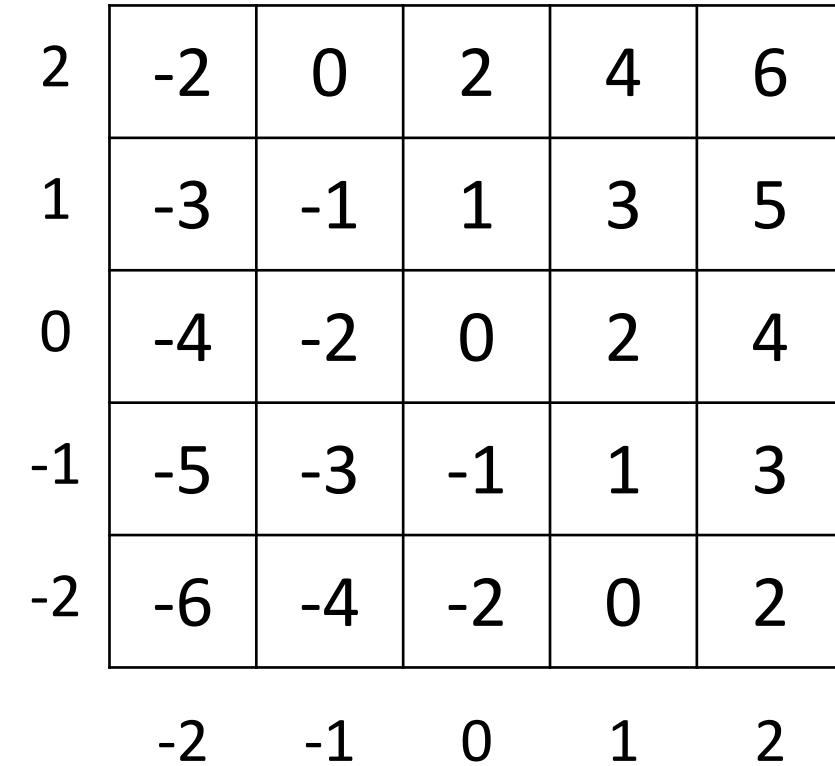
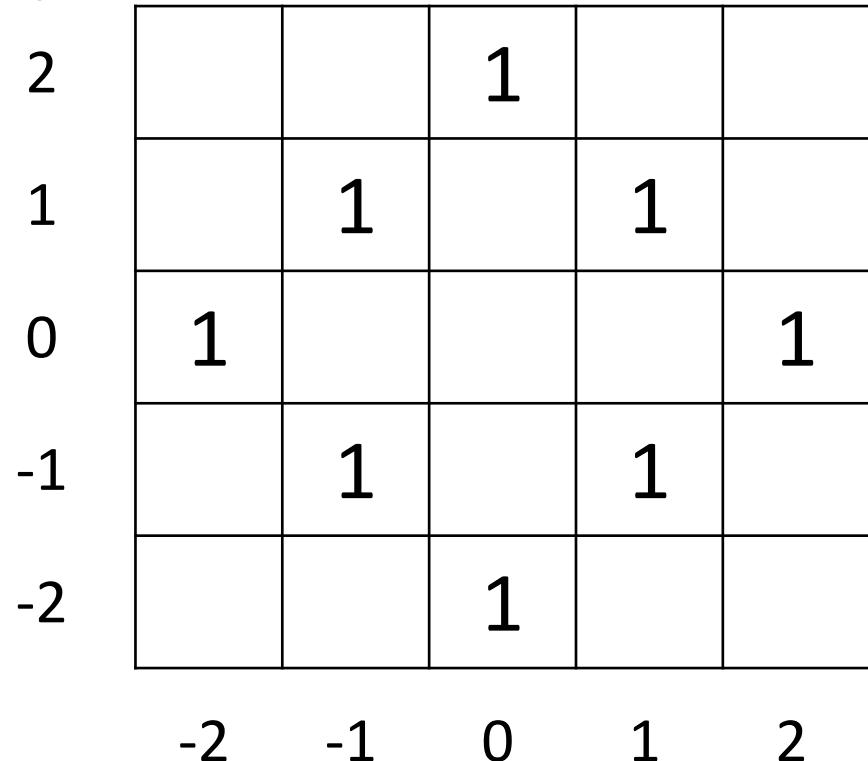




Image to Function

y



x

$$f(x, y) = \begin{cases} 1 & \text{if } |x| + |y| = 2 \\ 0 & \text{otherwise} \end{cases}$$

Image Function Operations

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Flip

$f(x, y)$

		1		
	1			
1	1			
	1			
		1		

$f(-x, y)$

		1		
			1	
			1	1
				1
			1	

Negate

$f(x, y)$

		1		
	1	1	1	
1	1		1	1
	1	1	1	
		1		

$\neg f(x, y)$

Add

$f(x, y)$

	2	2	2	
	2		2	
	2	2	2	

$f(x, y) + 10$

10	10	10	10	10
10	12	12	12	10
10	12	10	12	10
10	12	12	12	10
10	10	10	10	10



Write the image operation in the blank

(ignore blank)

$f(x, y)$

	3	2	1	
	2			
	1			

mask
out
0's

$f(x,y)+4$

	7	6	5	
	6			
	5			



Write the image operation in the blank

$f(x, y)$

	3	2	1	
	2			
	1			

$-f(x,y)$

	-3	-2	-1	
	-2			
	-1			



Write the image operation in the blank

$f(x, y)$

	3	2	1	
	2			
	1			

$1-f(x,y)$

1	1	1	1	1
1	-2	-1	0	1
1	-1	1	1	1
1	0	1	1	1
1	1	1	1	1



O Write the image operation in the blank

$f(x, y)$

	3	2	1	
	2			
	1			

$f(x, -y)$

	1			
	2			
	3	2	1	



Write the image operation in the blank

$f(x, y)$

	3	2	1	
	2			
	1			

$f(-x, y)$

	1	2	3	
			2	
			1	



Write the image operation in the blank

$f(x, y)$

	3	2	1	
	2			
	1			

$1-f(x,-y)$

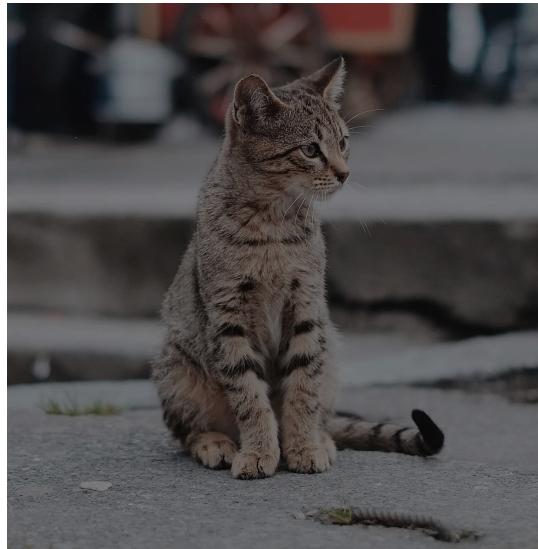
	-1			
	-2	-1		

Q: What are the operations for A and B?

f



$$A = f - 50$$



$$B = f + 50$$



Q: What are the operations for A and B?

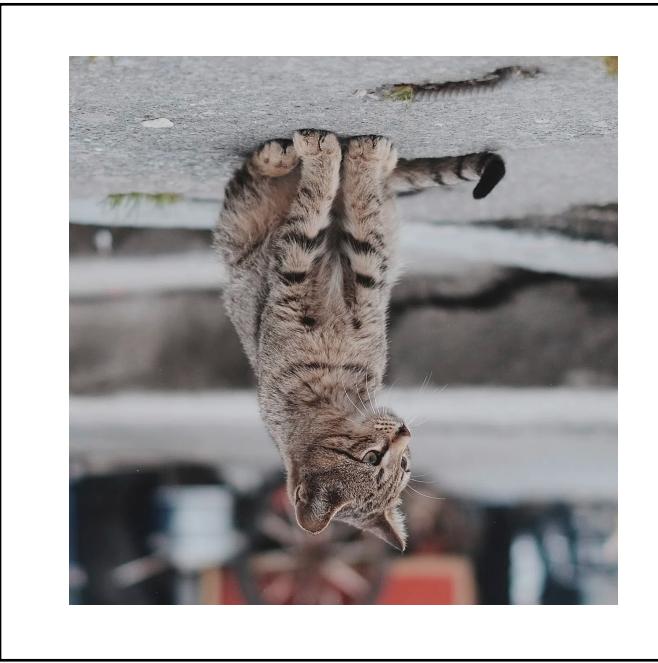
$$f(x,y)$$



y

x

$$A = f(x, -y)$$



y

x

$$B = f(-x, y)$$



y

x

Add Two Images

f

1	1	1	1	1

g

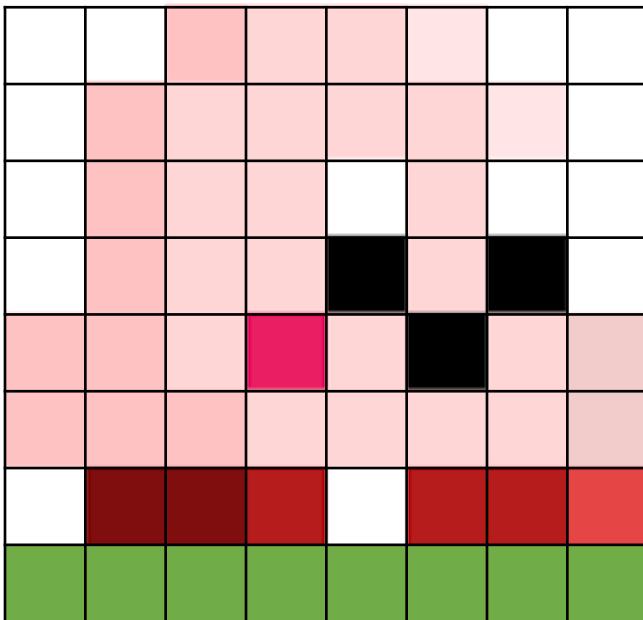
		3		
		3		
		3		
		3		
		3		

f + g

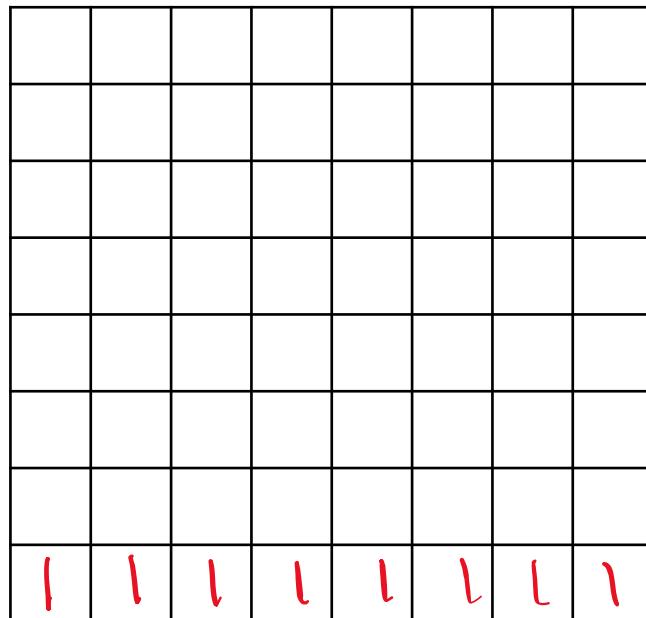
		3		
		3		
1	1	4	1	1
		3		
		3		

Masking

f

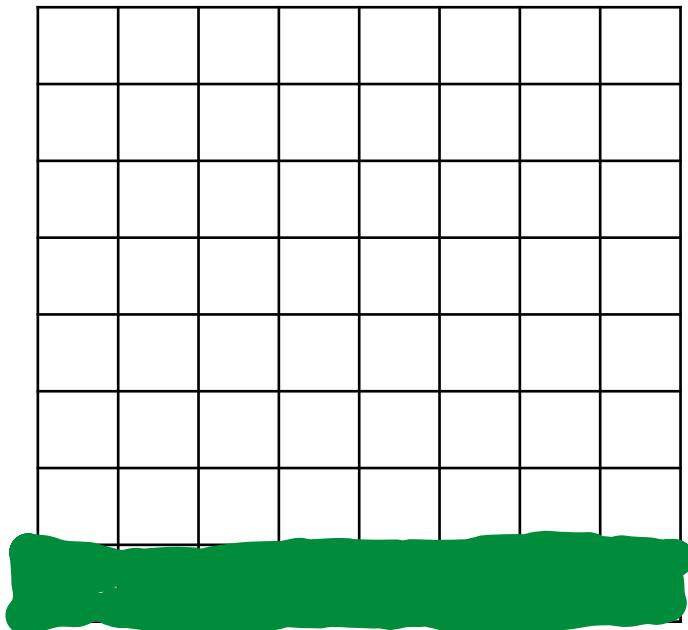


1



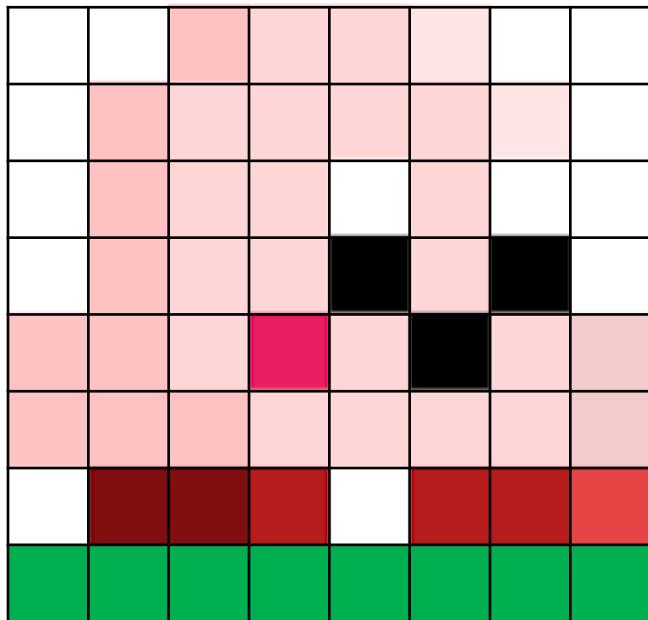
(AND)

f & m



Filter

f



"eye"

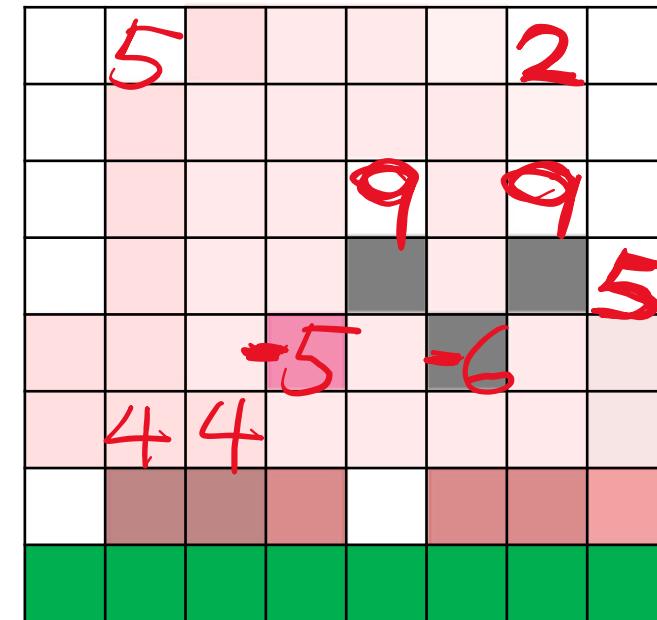
$\begin{matrix} 255 \\ 0 \end{matrix}$

h

feature
map

cross-
correlation

$$r = f \otimes h \leftarrow \text{kernel}$$



(Normalize 0~9)



What is the mask m ?

f

1	1	1	1	1	1	
1	2	3	3	2	1	
1	3	5	5	3	1	
1	3	5	5	3	1	
1	2	3	3	2	1	
1	1	1	1	1	1	

m

0	0	0	0	0	0	
0	0	1	1	0	0	
0	1	0	0	1	0	
0	1	0	0	1	0	
0	1	1	1	1	0	
0	0	1	1	0	0	

f & m

			3	3		
		3			3	
		3			3	
	2	3	3	2		
		1	1			



Flip the image (use PowerPoint's flip)



$f(x, y)$

y

x



$f(-x, -y)$

y

x



$f(-x, y)$

y

x



Resize the image (use PowerPoint's resize)



$f(x, y)$

$f(2x, y)$

$f(x/2, 2y)$



y

x



x