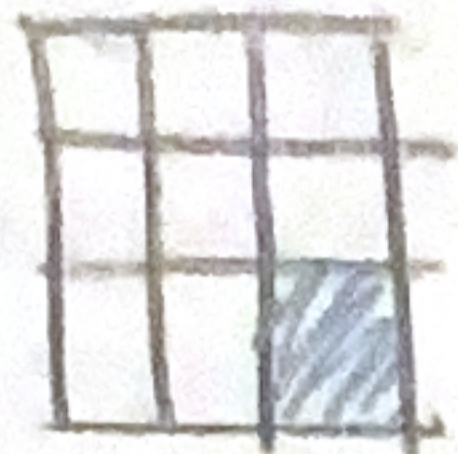


Spatial Filtering

Linear Spatial Filtering

Sum of products between image f & filter kernel w .

$$g(x,y) = w(-1,-1) f(x-1,y-1) + w(-1,0) f(x-1,y) + \dots + w(0,0) f(x,y) + \dots + w(1,1) f(x+1,y+1)$$



$$g(x,y) = \sum_{s=-a}^a \sum_{t=-b}^b w(s,t) \cdot f(x+s,y+t)$$

Spatial Correlation & Convolution

Correlation: Moving center of a kernel over an image & computing sum of products at each location

Measurement between similarity of two signals

$(x,y) \rightarrow$ any point in the image

w

$(-1,-1)$	$(-1,0)$	$(-1,1)$
$(0,-1)$	$(0,0)$	$(0,1)$
$(1,-1)$	$(1,0)$	$(1,1)$

kernel coefficients

f

$(x-1, y-1)$	$(x-1, y)$	$(x-1, y+1)$
$(x, y-1)$	(x, y)	$(x, y+1)$
$(x+1, y-1)$	$(x+1, y)$	$(x+1, y+1)$

pixel values under kernel when it's centered on (x,y)

Correlation: $(w \cdot f)(x,y) = \sum_{s=-a}^a \sum_{t=-b}^b w(s,t) f(x+s,y+t)$

Convolution: Measurement of effect of one signal on another

$(w * f)(x,y) = \sum_{s=-a}^a \sum_{t=-b}^b w(s,t) f(x-s,y-t)$

flip the kernel on both sides

When kernel is symmetrical, correlation = convolution