Understanding Covariance

	$f(x,y)$	$X = 0$	$X = 1$
Y	0	0	$1/2$
	1	$1/2$	0

$\sigma_{\underline{XY}} = -\frac{1}{4}$

	$f(x,y)$	$X = 0$	$X = 1$
Z	0	$\frac{26}{52}$	$13/52$
	1	0	$13/52$

$\sigma_{\underline{XY}} = 0.125$

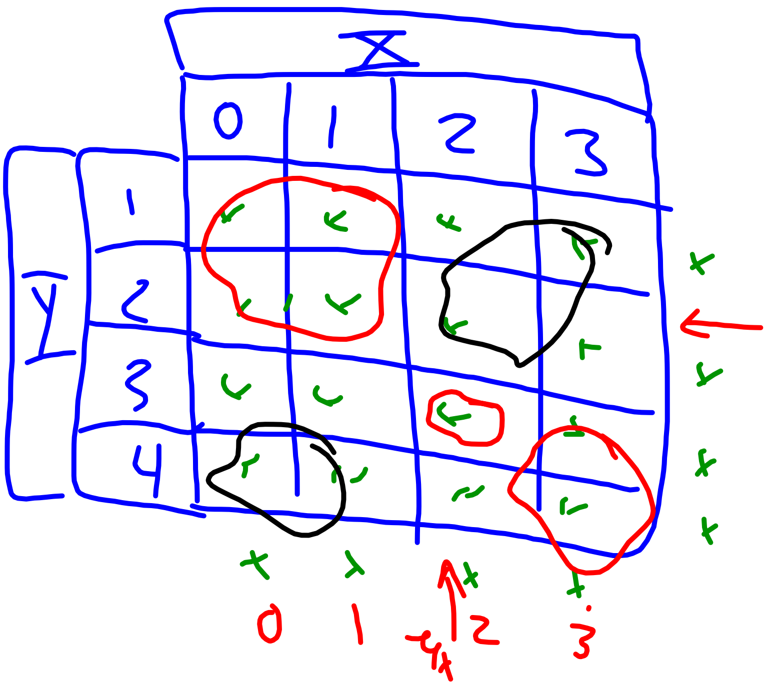
		X	
	f(x,y)	0	1
W	0	$\frac{20}{52}$	$\frac{20}{52}$
	1	$\frac{6}{52}$	$\frac{6}{52}$

$\sigma_{XY} = 0$

X = black

W = face

Indep $\Longrightarrow \sigma_{XY} = 0$



Y \ X	−1	1	
−1	0	1/4	1/4
0	1/2	0	1/2
1	0	1/4	1/4
	1/2	1/2	

$$\sigma_{XY} := \sum \sum (x - \mu_X)(y - \mu_Y) f(x,y)$$

$$g(-1)h(-1) = \frac{1}{2} \cdot \frac{1}{4} = \frac{1}{8} \neq 0 = f(-1,-1)$$

X and Y are not indep

$E(XY)$

$$f(x,y) = \begin{cases} \frac{1}{26}(x^2+2y) & \text{for } (x,y) \in [0,2] \times [0,3] \\ 0 & \text{otherwise} \end{cases}$$

$$g(x) = \int_{-\infty}^{\infty} f(x,y)\,dy = \int_0^3 \frac{1}{26}(x^2+2y)\,dy = \frac{3x^2}{26} + \frac{9}{26}$$

$$h(y) = \frac{4y}{26} + \frac{8}{78}$$

$$v(x|y) = \frac{f(x,y)}{h(y)} = \frac{\frac{1}{\cancel{26}}(x^2+2y)}{3\cdot\frac{4y}{\cancel{26}} + \frac{8}{\cancel{78}}} \cdot \frac{\overset{3}{\cancel{78}}}{\cancel{78}}$$

$$= \frac{3x^2+6y}{12y+8}$$

$$w(y|1) = \frac{f(1,y)}{g(1)} = \frac{1+2y}{12}$$

$$w(y|x) = \frac{f(x,y)}{g(x)}$$

$$\gamma = P(\quad) =$$