Görüntü İşleme

Ders 12: Granulometry, geometrik dönüşüm, feature extraction

Orijinal not: Ders-12.pdf

UYARI Bu belge, el yazısı ders notlarından Claude (Anthropic) yardımıyla dijitale aktarılmıştır. Yardımcı kaynak olarak hazırlanmıştır; hata veya eksik içerebilir. Lütfen orijinal notları ve ders kaynaklarını esas alın.

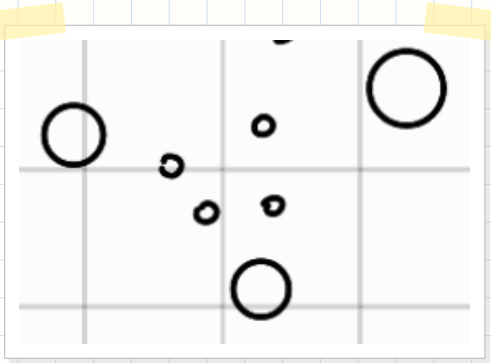
NOTICE *This document was transcribed from handwritten lecture notes with the help of Claude (Anthropic). It is meant as a supplementary resource and may contain errors or omissions. Always check against the original notes and official course material.*

orj. s. 1

? okunamadı

Parçacık sayma

Granulometry



orijinal çizim, s. 1

opening erosion, dialation

Şekil: Bu sayfa basılı materyal içeriyor (ör. ders slaytı); dijitalleştirilmedi.
(orijinal notta, s. 1)

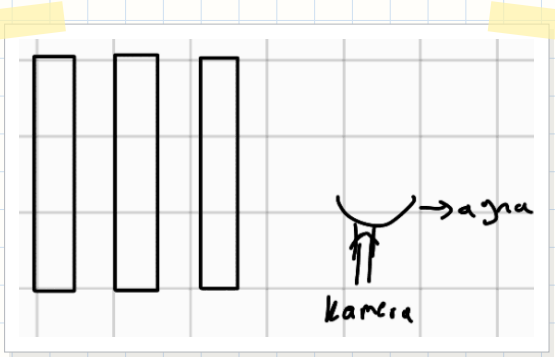
yapı elemanı her adımda büyütülür
Her pikselin değeri toplanır
birbirinden çıkarırsak

ne büyüklükte objeler var

? Router chef segmentasyon

orj. s. 2

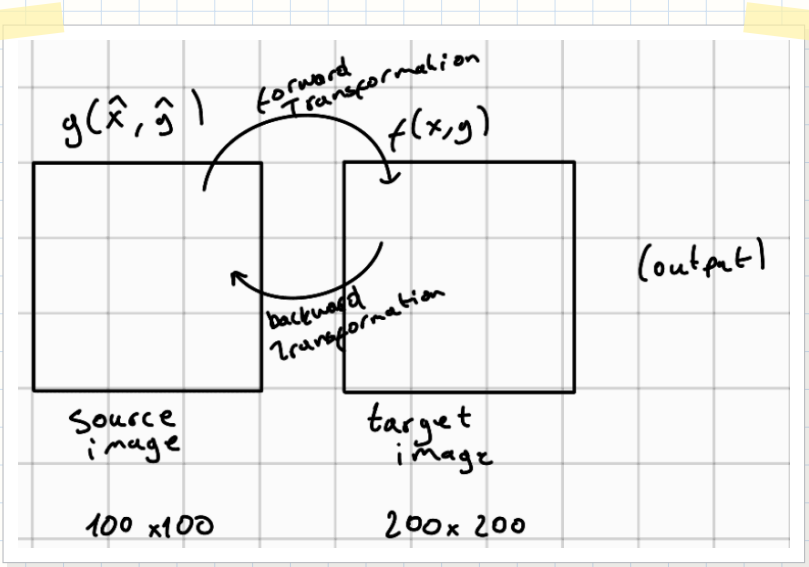
Geometric Transformasyon



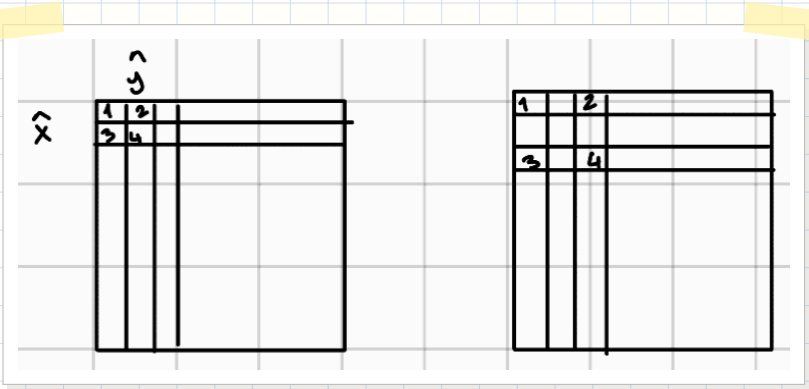
orijinal çizim, s. 2

hepsini aynı boyutta görmez

Geometric Transformation



orijinal çizim, s. 2



orijinal çizim, s. 2

pseudo-code

for x = 0; nrows in target
  for y = 0; ncols in target
    compute $\hat{x}$ = inverse spatial transformation of x
    $\hat{y}$ = inverse spatial Transformation y
    $f(x,y)$ = gray level interpolation of $g(\hat{x},\hat{y})$

orj. s. 3

scaling: $\hat{x} = \frac{x}{c}$ $\hat{y} = \frac{y}{c}$ c büyünce görüntü büyür

rotation:

$$\hat{x} = x\cos\theta - y\sin\theta$$
$$\hat{y} = x\sin\theta + y\cos\theta$$

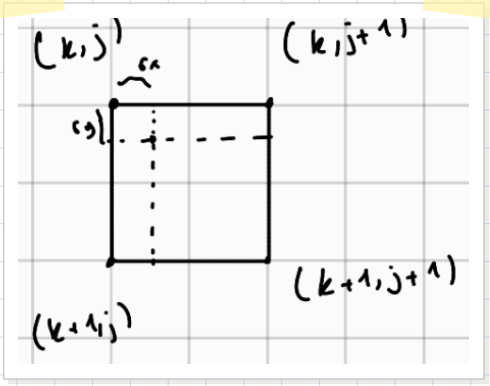
$$\begin{bmatrix}\hat{x}\\ \hat{y}\end{bmatrix} = \begin{bmatrix}\cos\theta & -\sin\theta\\ \sin\theta & \cos\theta\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix}$$

Gray level interpolasyon

level 0: nearest neighbour (NN)
level 1: bilinear interpolation (BI)

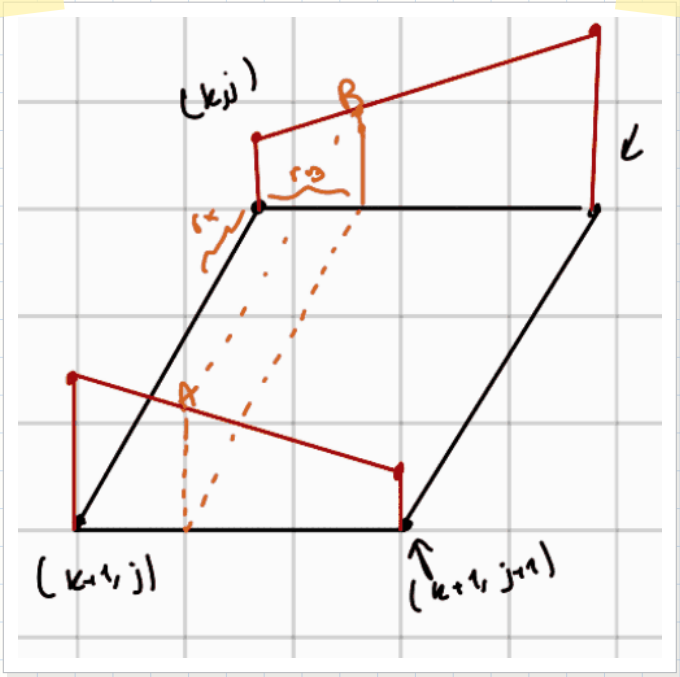
$\hat{x} = k + r_x$
$\hat{y} = j + r_y$

$\hat{x} = \frac{4}{3} = \overset{k}{1} + \overset{r_x}{\frac{1}{3}}$
$\hat{y} = \frac{15}{2}$[1] $= \underset{k}{2} + \underset{r_y=3/6}{\frac{3}{6}}$

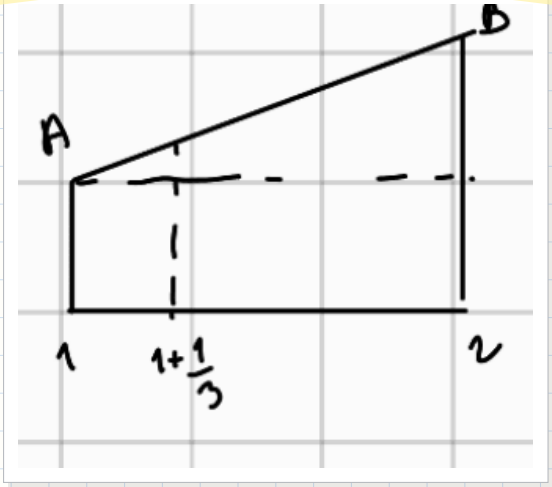


orijinal çizim, s. 3

[1] Claude notu: muhtemelen $\frac{15}{6}$ olmalı.



orijinal çizim, s. 3



orijinal çizim, s. 3

orj. s. 4

Örnek

	0	1	2	3
0	1	1	100	1
1	1	1	100	1
2	100	100	100	100
3	1	1	100	1

	y		
	0	1	2
0			
x 1			
2			

$c = \frac{3}{4}$ $c = \frac{2}{3}$ alma

Sonuç

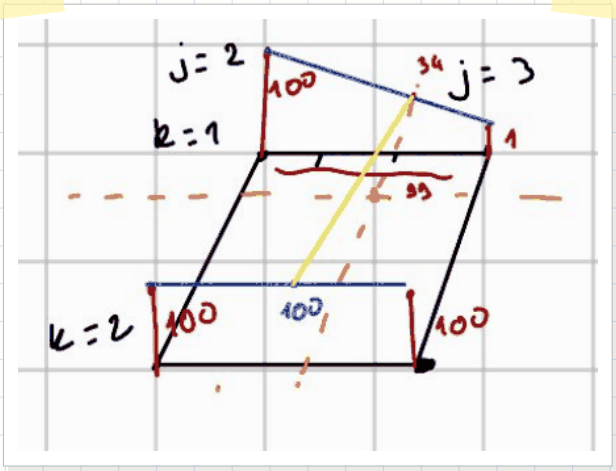
	0	1	2
0	1	34	34
x 1	34	56	56
2	34	56	56

x	y	$\hat{x}$	$\hat{y}$	NN	BI
0	0	0	0	0,0 1	
0	1	0	4/3	0,1 1	
0	2	0	8/3	0,3 1	
1	0	4/3	0	1	
1	1	4/3	4/3	1	
1	2	4/3	8/3	1	
2	0	8/3	0	1	
2	1	8/3	4/3	1	
2	2	8/3	8/3	1	

$x = 1$ $y = 2$

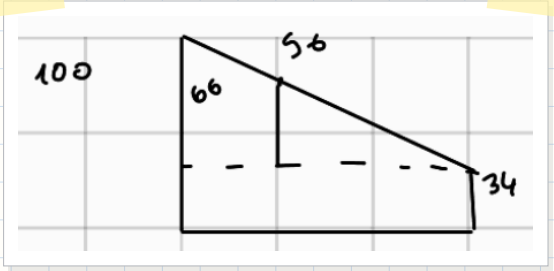
$\hat{x} = \frac{4}{3}$ $\hat{y} = \frac{8}{3}$

$\hat{x} = 1 + \frac{1}{3}$ $\hat{y} = 2 + \frac{2}{3}$



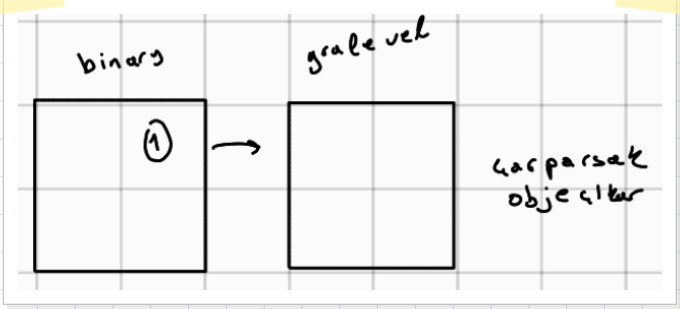
orijinal çizim, s. 4

orj. s. 5



orijinal çizim, s. 5

Feature Extraction



orijinal çizim, s. 5

Moment hesabı yapabiliriz

fourier discriptor



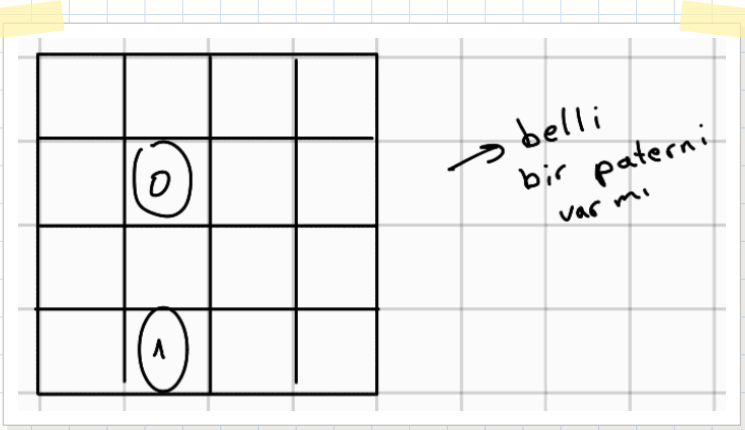
orijinal çizim, s. 5

$$s(r) = x + jy$$

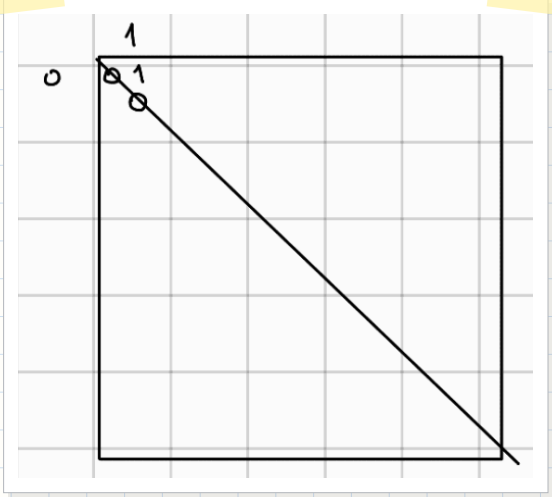
$$S[k] = \sum_{r=0}^{R} s(r)\, e^{-j2\pi k/R}$$

Texture analizi Co-occurance Matrix

$$P_{\phi,d}(a, b)$$



orijinal çizim, s. 5



orijinal çizim, s. 5