Görüntü İşleme

Hough dönüşümü ve bağlı bileşenler

Orijinal not: Ders9.pdf

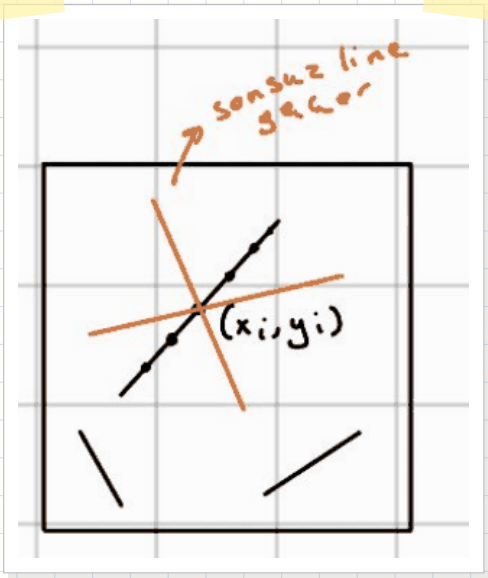
UYARI Bu belge, el yazısı ders notlarından Claude (Anthropic) yardımıyla dijitale aktarılmıştır. Yardımcı kaynak olarak hazırlanmıştır; hata veya eksik içerebilir. Lütfen orijinal notları ve ders kaynaklarını esas alın.

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

Hough Transform

Input : binary image (0,1) [edge map]

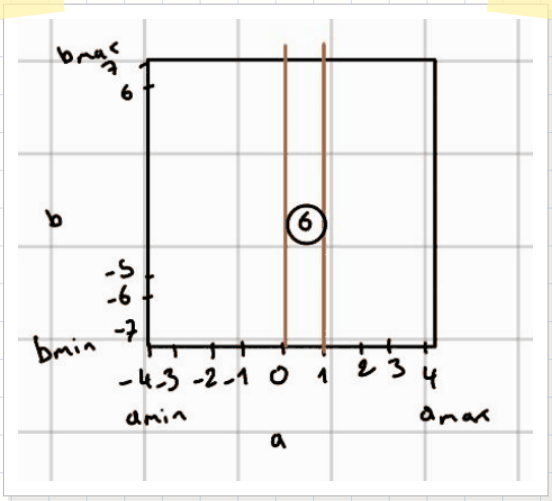


orijinal çizim, s. 1

$y_i = a x_i + b$

b 0 olursa y merkezden geçer

$$b = -a x_i + y_i$$



orijinal çizim, s. 1

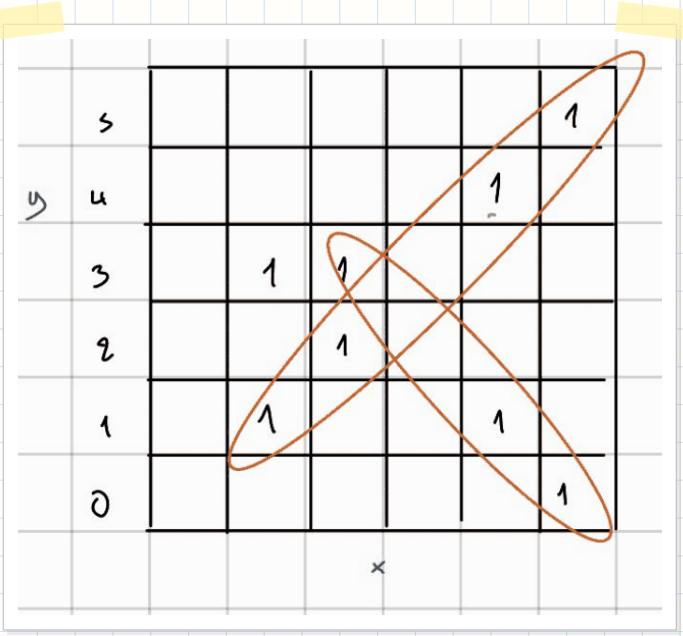
doğru a'yı bildiğinde aynı b'de yoğunlaşma olacak

$x_i = 1,\ y_i = 1$

$$b = -a\,x_i + y_i$$
$$b = -a + 1$$
$$a = -2 \Rightarrow b = 3$$
$$a = -1 \Rightarrow b = 2$$

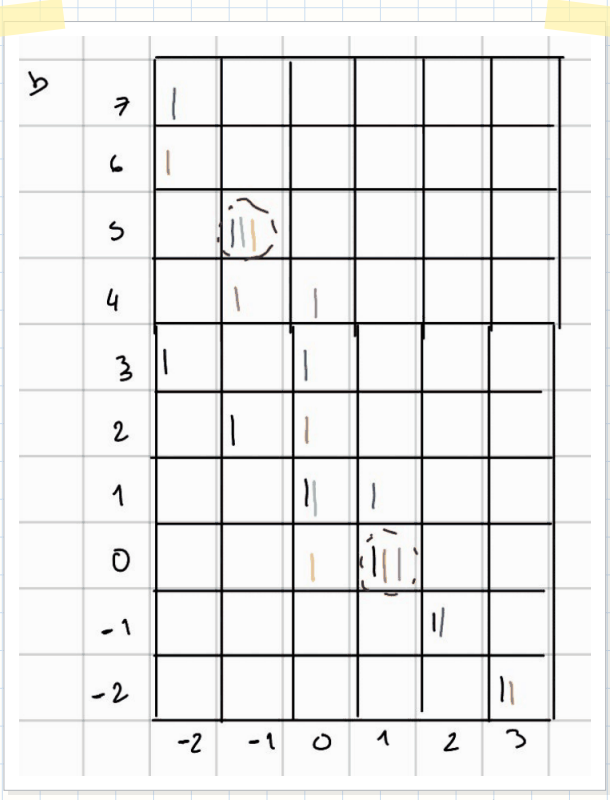
a	b
-2	3
-1	2
0	1
1	0
2	-1
3	-2

Örnek:



orijinal çizim, s. 1

2 tane line var



orijinal çizim, s. 1

$x_i = 2,\ y_i = 3$

$$b = -a x_i + y_i$$
$$b = -2a + 3$$

$x_i = 4,\ y_i = 1$

$b = -4a + 1$

$x_i = 5,\ y_i = 0$

$b = -5a$

$x_i = 2,\ y_i = 2$

$b = -a\,x_i + y_i$

$b = -2a + 2$

a	b
−2	6
−1	4
0	2
1	0
2	−2
3	−4

$x_i = 4,\ y_i = 4$

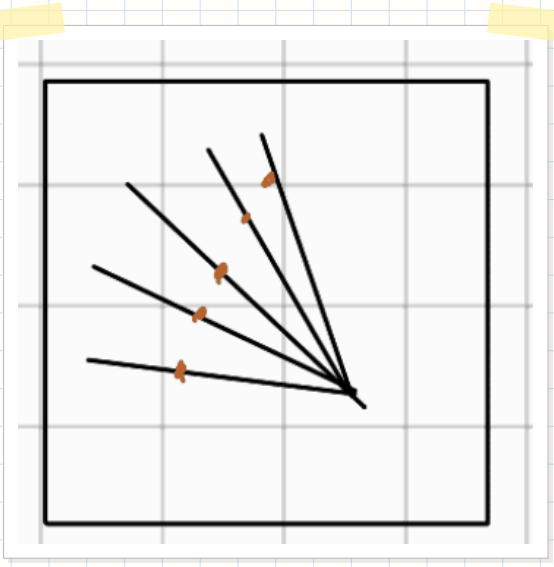
$b = -a\,x_i + y_i$

$b = -4a + 4$

a	b
−2	12
−1	8
0	4
1	0
2	−4

orj. s. 2

eğimi 3 yaparsak 3'ün üstü line olur

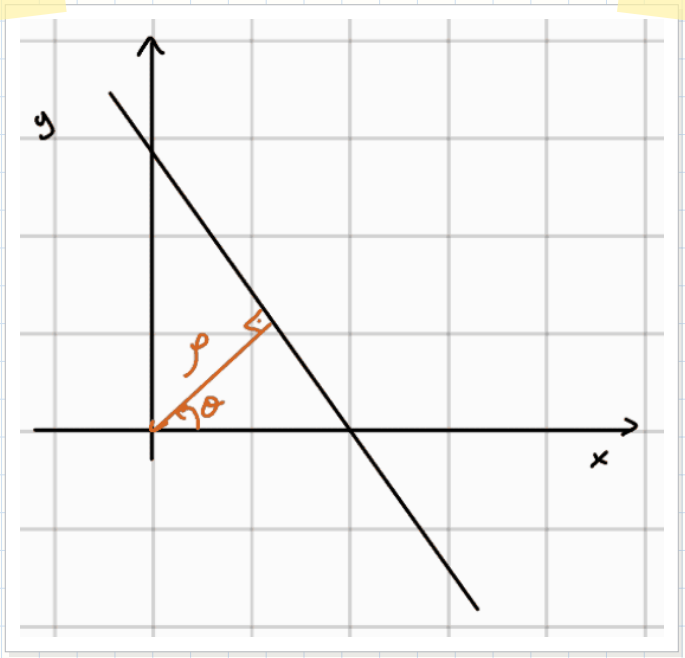


orijinal çizim, s. 2

$a \to -\infty, \infty$ sıkıntı

peki hangi sıklıkla

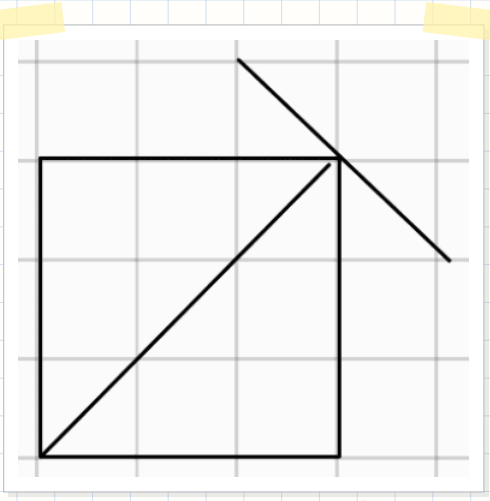
a lineer olsa da ona göre açı lineer değil



orijinal çizim, s. 2

$\rho = x\cos\theta + y\sin\theta$

$y = ax + b$



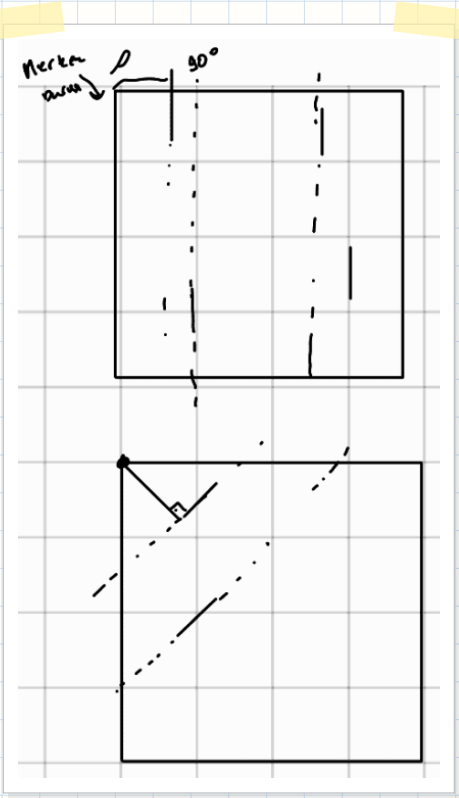
orijinal çizim, s. 2

ρ ve θ aşağıdaki gibi

θ −90 ÷ 90 aralığında

Fig 10.32

orj. s. 3



orijinal çizim, s. 3

> **Şekil:** Bu sayfa basılı materyal içeriyor (Şekil 10.33 ve 10.34: Hough dönüşümü parametre uzayı örnekleri); dijitalleştirilmedi.
> *(orijinal notta, s. 3)*

$\rho = y \sin\theta$

tüm θ'larda $\rho = 0$

$-90 \qquad 90$

$\leftarrow 90°$

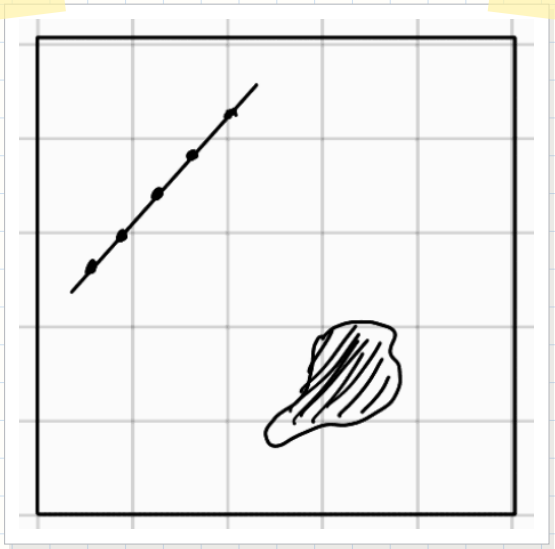
> ⚠ **Dikkat!**
> Sınavda çıkar

orj. s. 4

Daire için

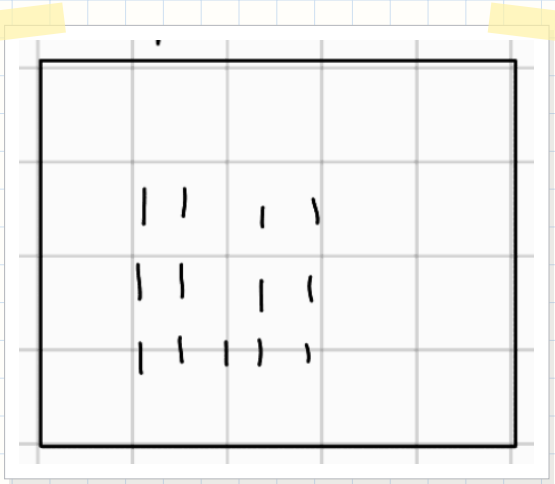
$$(x - c_1)^2 + (y - c_2)^2 = c_3^2$$

Connected Component

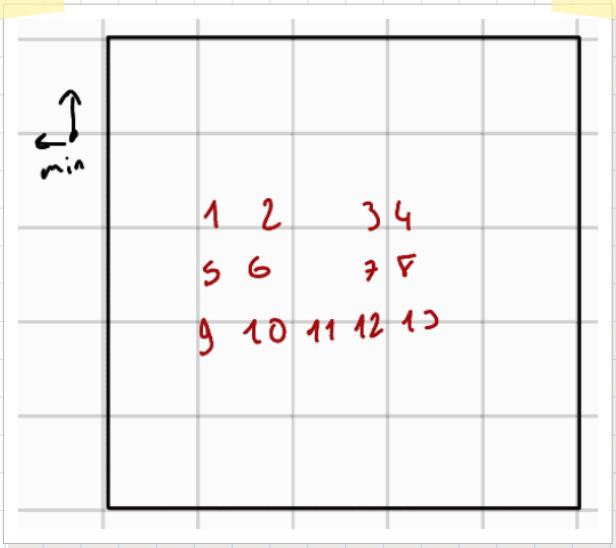


orijinal çizim, s. 4

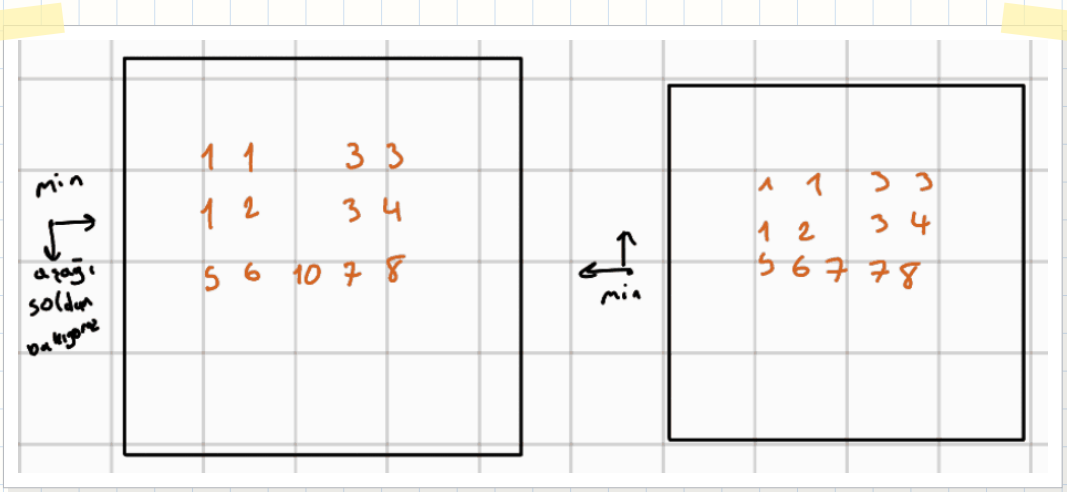
Haralick



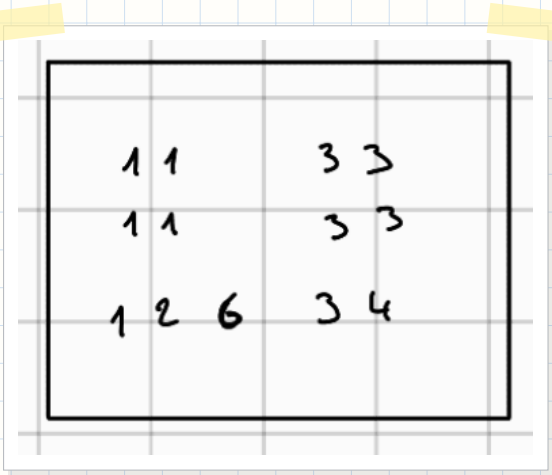
orijinal çizim, s. 4



orijinal çizim, s. 4

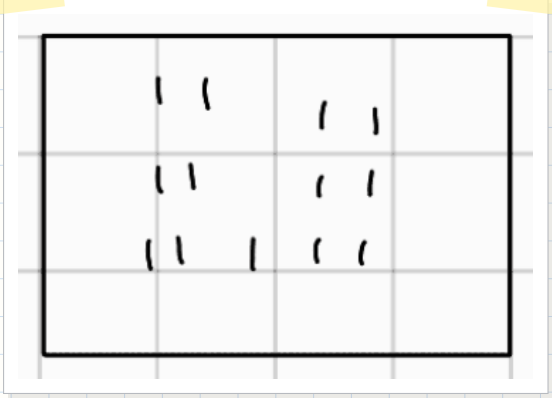


orijinal çizim, s. 4



orijinal çizim, s. 4

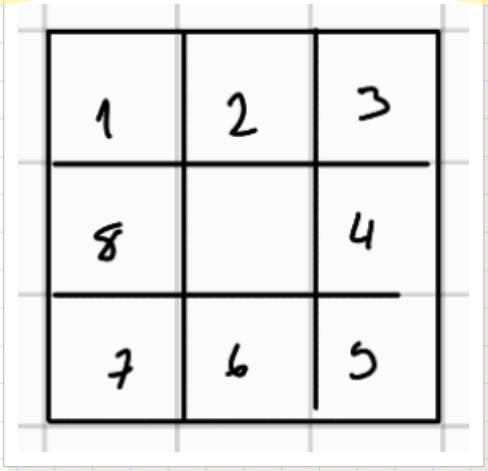
orj. s. 5



orijinal çizim, s. 5

Recursive Connected Component labeling

while end of image is reached
do{ continue to scan image until
an unlabeled "1" pixel is reached.
if (not end of image){
assign a new label to the pixel
recursively assign same label to
"1" neighbors }

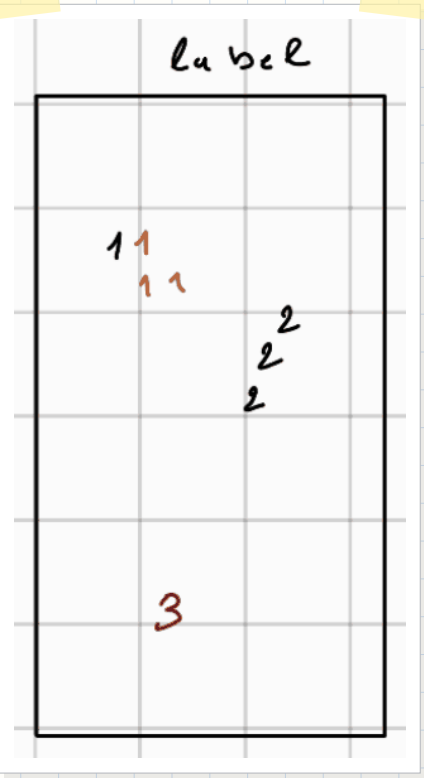


orijinal çizim, s. 5

soldan sağa
yukarıdan aşağıya



orijinal çizim, s. 5



orijinal çizim, s. 5