Finding More Shapes 271-279

i. circle.

$$(x-x_0)^2 + (y-y_0)^2 = r^2$$

circle centre x_0, y_0 points x, y radius r

" " x, y " x_0, y_0 " r

$\forall x, y$

IF edge$(x, y) \geq$ threshold

$\forall r \in r_{min}, r_{max}$

$\{\forall \theta \quad x' = x + r\cos\theta$

$y' = y + r\sin\theta$

$\lceil r \rceil$

acum(x', y') PLUS 1 $\}$

afterwards search for peak in accumulator

ii) Ellipses?

$$\frac{(x-x_0)^2}{a^2} + \frac{(y-y_0)^2}{b^2} = 1$$

gives 4D parameter

add orientation 5D parameter space.

accumulator space is 10^{10} large!

for 100 values for each parameter

iii) break it down?

use differentiation

eg. circle.

$$(x-x_0)^2 + (y-y_0)^2 = r^2$$

Differentiate $2(x-x_0) + 2(y-y_0)\frac{dy}{dx} = 0$

$$\Rightarrow \frac{dy}{dx} = \frac{-(x-x_0)}{y-y_0}$$

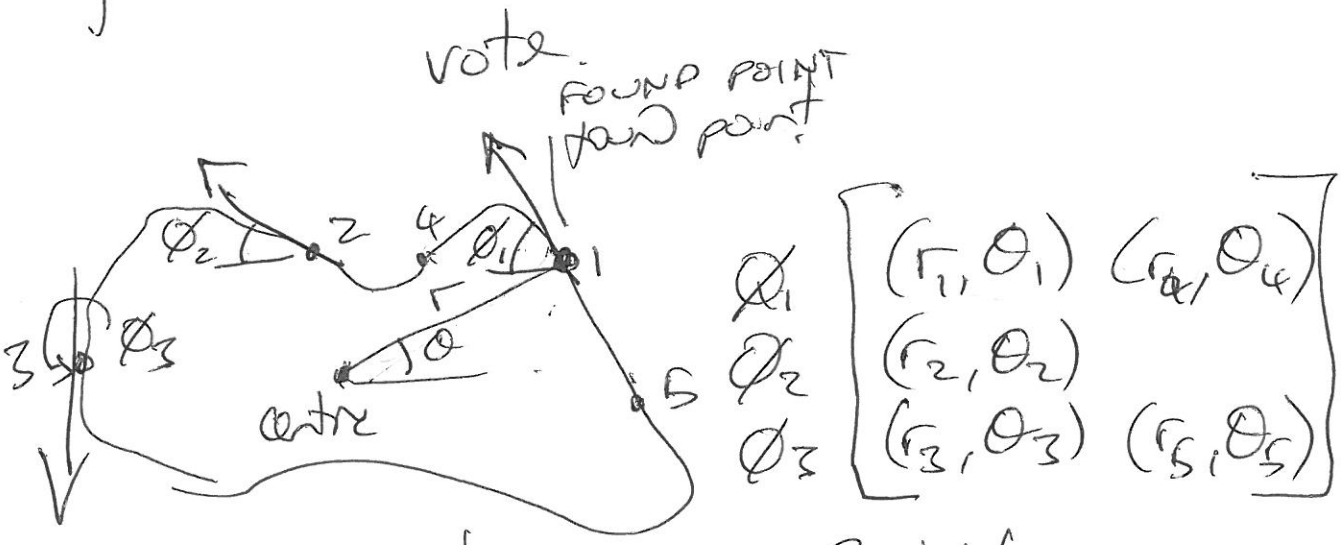
↑

edge direction.

IV. arbitrary shapes have no equation.

a). template matching
b). generalised Hough transform.

form an R-table & use it to



voting? R-table

image.

Procedure, give R table.

→ find point
get edge direction.
look up combinations of r, θ
vote in accumulator space.