

Haar cascade

27 November 2023

07:11

face
eyes
car
frontal body

Rapid Object Detection using

Boosted cascade of simple detection.

↳ Adaboost

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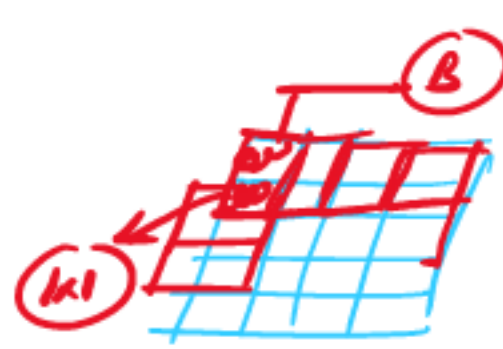
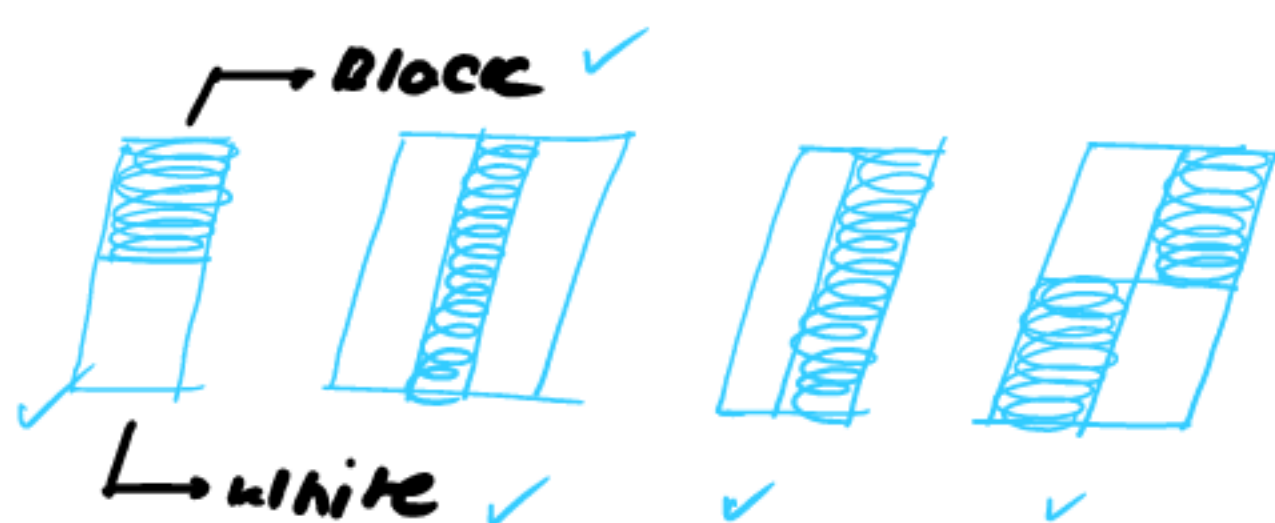


Haar features.



Divide pixels into 2 groups.

Black
white

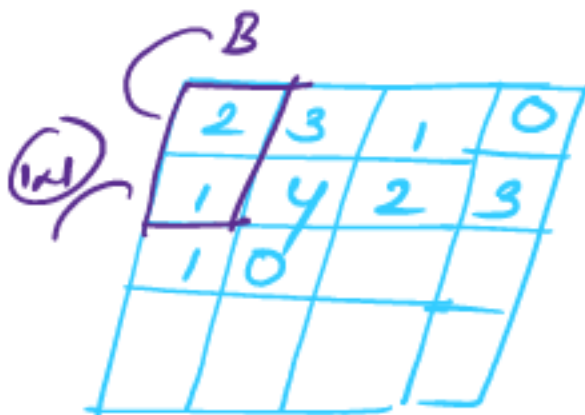


2 Rectangle

3 Rectangle

4 Rectangle features.

Delta = white region - black region



$$= 1 - 2$$

$$= -1$$

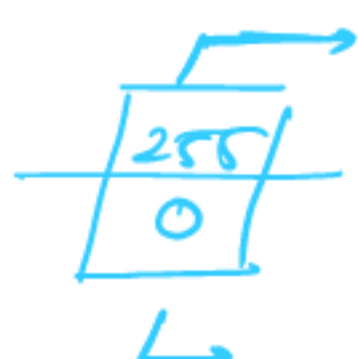
$$\text{Delta ②} = 4 - 3$$

$$= 1$$

$$\text{Delta ③} = 2 - 1$$

$$= 1$$

$$\text{Delta} = 3$$



$$255 - 0$$

$$= 255$$

$$\frac{0}{255} = 0 - 255$$

$$= -255$$

$$\frac{128}{128}$$

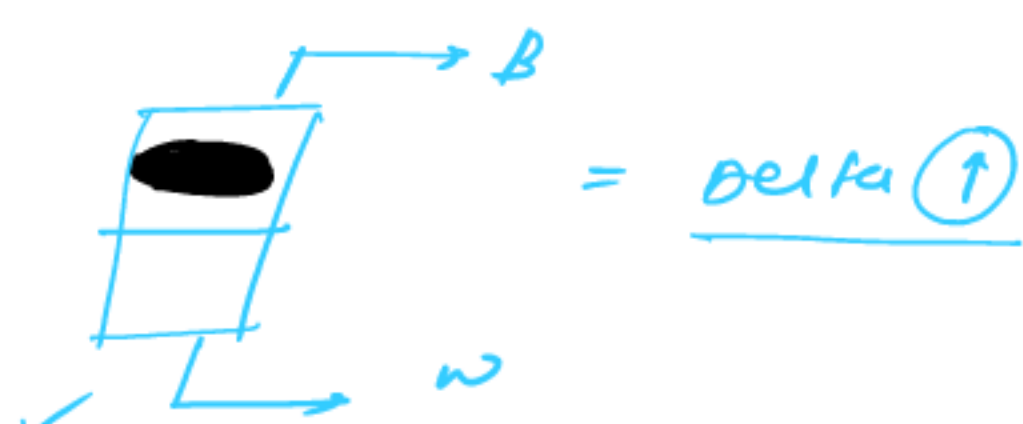
$$128 - 128$$

$$= 0$$

$$\frac{128}{128} = 0$$

every feature is suitable for specific portion:

Ex:



$$= \text{Delta ①}$$

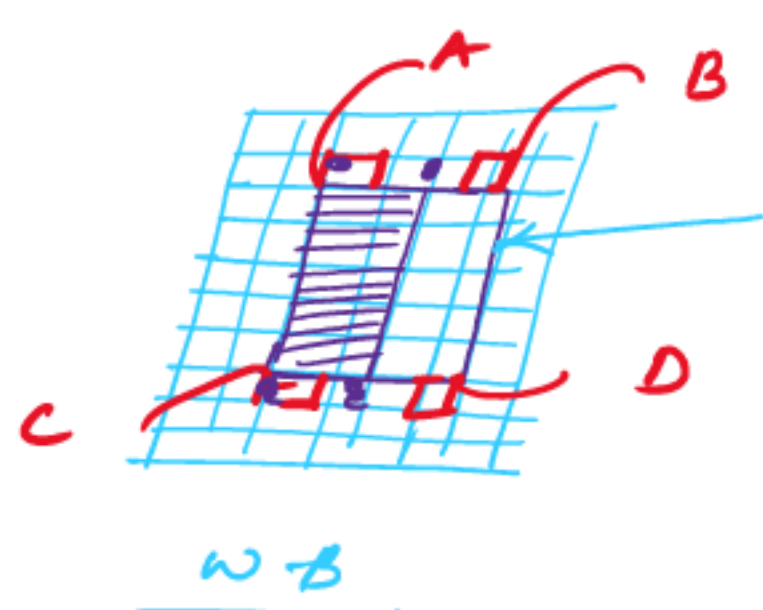
More



$$= \text{Delta ②}$$

* feature works in size and location.

Integral Image



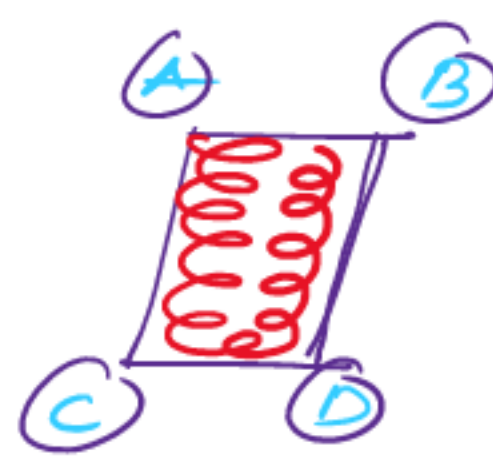
10	10	20	10	70
20	30	20	70	80
10	40	80	80	10

A	B
C	D

$$(D+A) - (B+C)$$

10	20	40	55	120
30	70	110	10	10
10	10	10	10	10

Top
+ left values



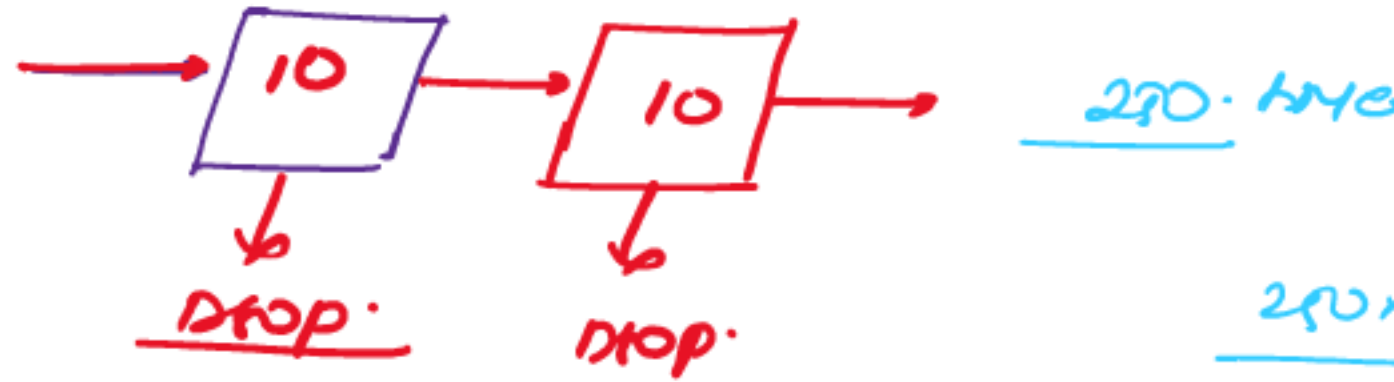
$$(D+A) - (B+C)$$

160,000 Features

2500 map

near classifiers

$$10 \times 250 = 2500$$



$$\frac{250 \times 10}{12500}$$



a1	a2	a3	a4
21	22	23	24

map



images

feature

2500

160,000 feature

detect