

# Computer Vision Assignment N<sup>o</sup>11

Theoretical Questions  
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## 1 Hit-or-Miss

The pixels marked with orange will only satisfy the pattern.

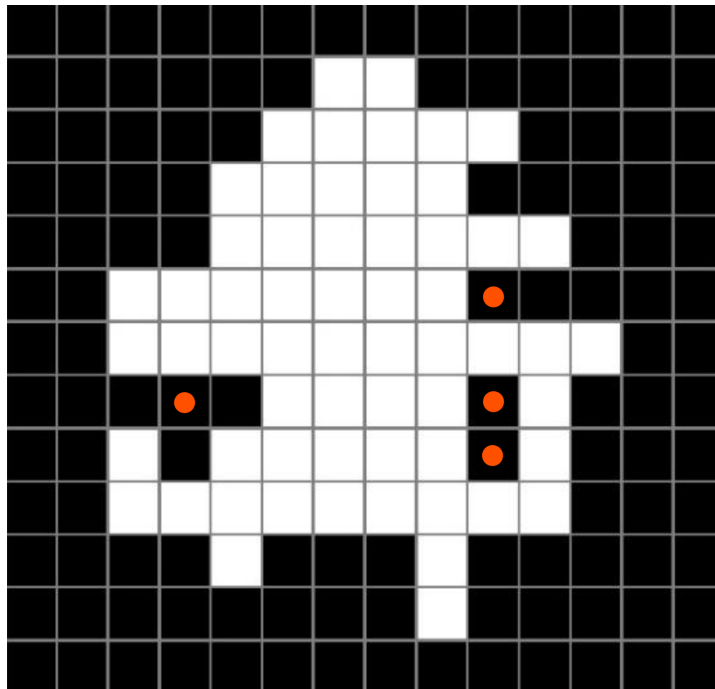


Figure 1: Points which satisfy the pattern

And the output image is as below.

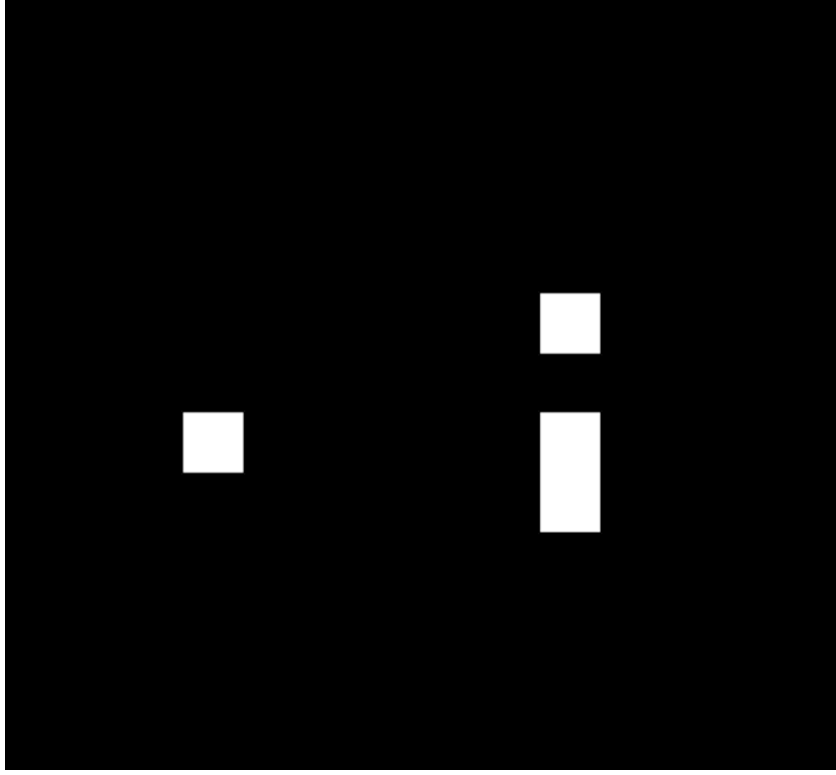


Figure 2: Output of Hit-or-Miss

## 2 Feature Extraction

### 1. Compactness of square:

Edge length of square :  $a$

$$Compactness = \frac{4\pi Area}{Perimeter^2} = \frac{4\pi a^2}{(4a)^2} = \frac{4\pi a^2}{16a^2} = \frac{4\pi}{16} = \frac{\pi}{4}$$

### 2. Detecting Sleepy Drivers:

**First**, we can use color descriptors to check if the eyelid is closed, if the eyelid is closed completely the eye is closed and the whole area of eye has a human skin color.

**Second**, we can detect circles in the eye region and we can detect the pupil of the eye, if it is a whole circle then the eye is completely open, but if its not a full circle the eye is semi open, and if there is no circle

detected at all, then the eye is completely closed and the eyelid is covering the pupil.

**Third**, also we can use compactness to figure out if the pupil shape is a full circle or not. Compactness also can be used to determine if the whole eye is closed which the region of the eye has a compactness of zero, if the eye is semi-open the compactness is low because when eye is semi-closed the shape is stretched and far from a full circle shape. If the eye is wide open it has a high compactness because a wide open eye has a shape similar to a full circle.