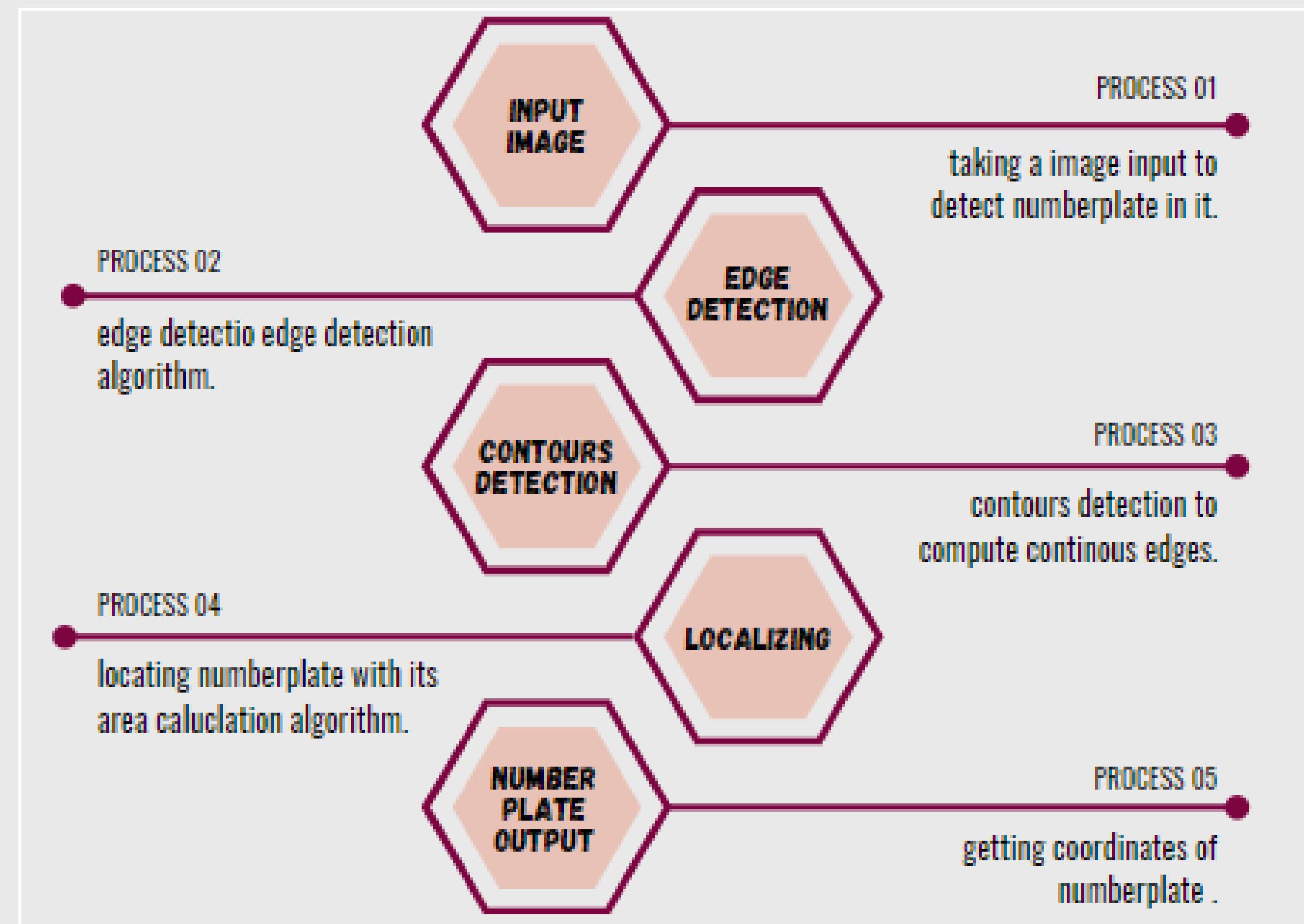


# CS322 - Project II

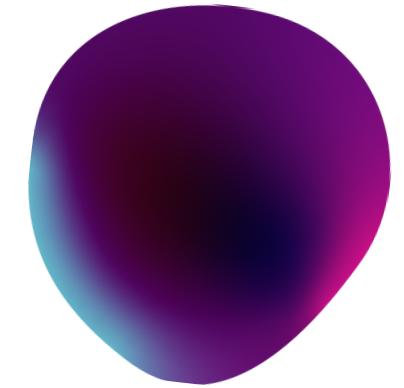
## Number plate localization using edge detection

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# PROCESS DIAGRAM



# Edge Detection Algorithm



Start

input grayscale image

Gaussian smoothing

Gradient & Direction map

Non-maximum suppression

Double thresholding

Edge tracking by hysteresis

Edge map

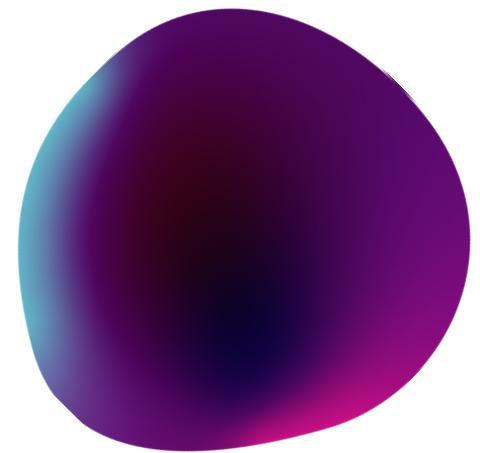
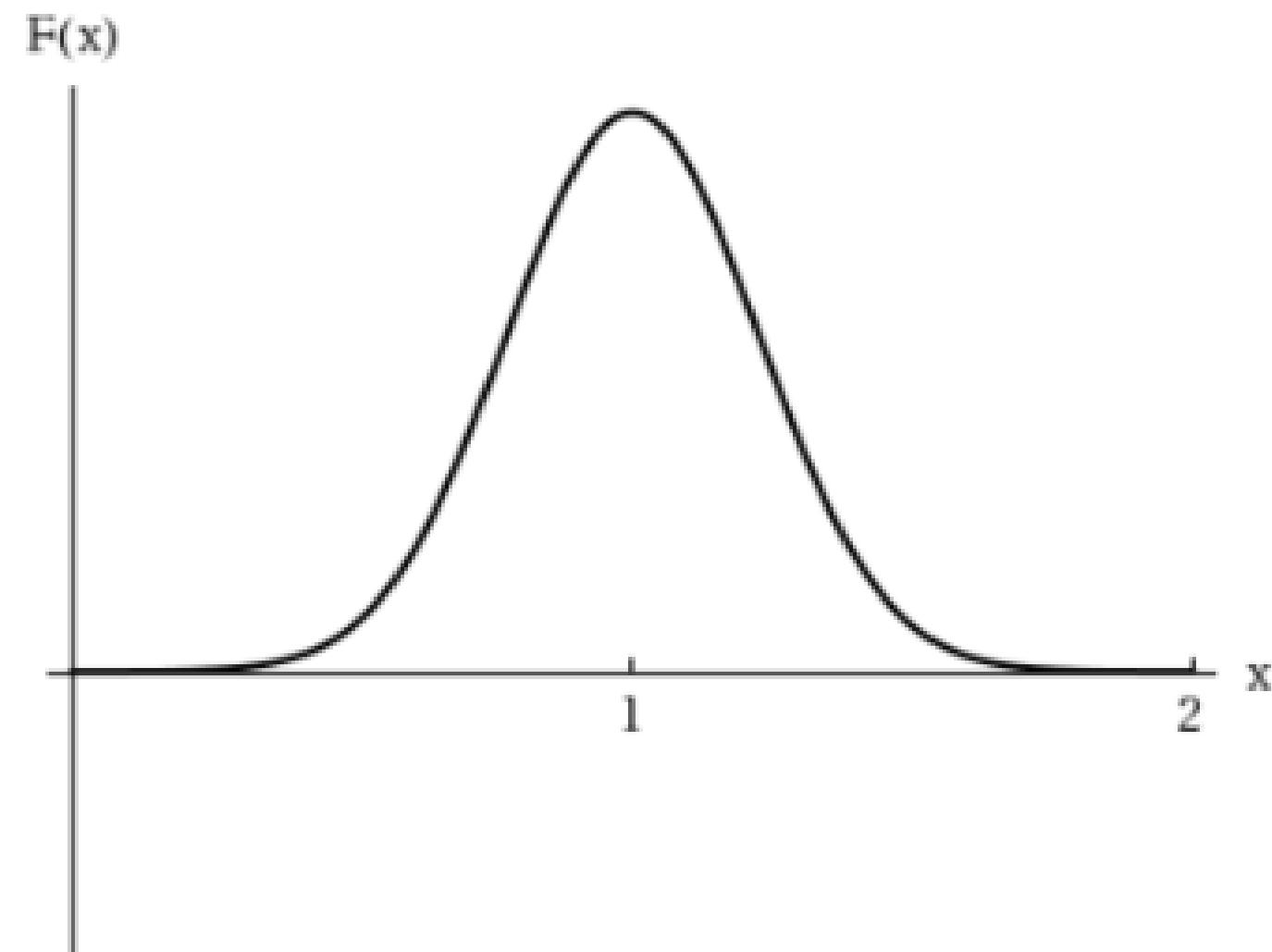
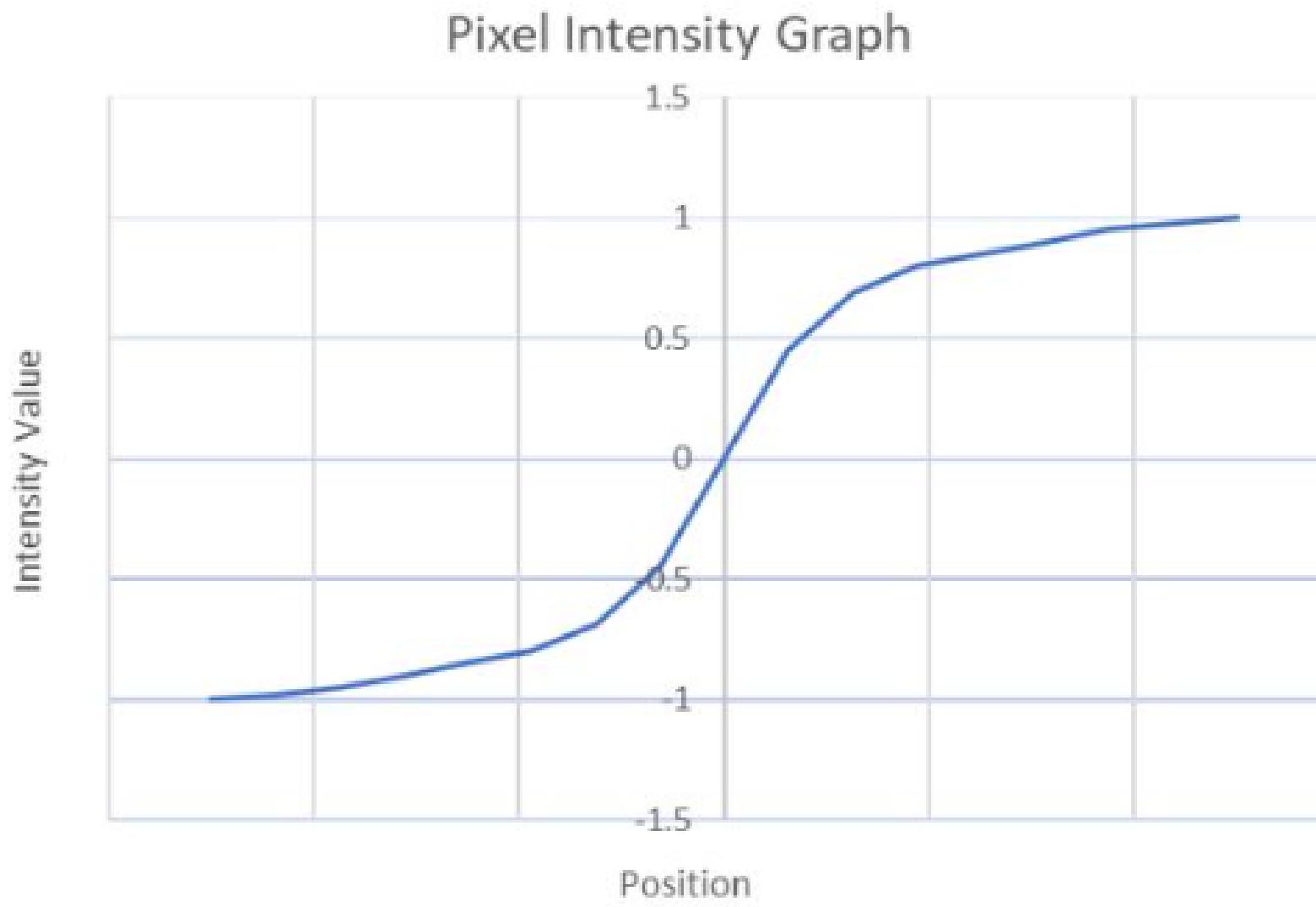
# 1 .Noise Reduction

Converting the image to grayscale image in order to eliminate brightest pixel to white and darkest pixel to black. To cancel noise in image since noise by using gaussian technique.

## 2. Gradient Calculation

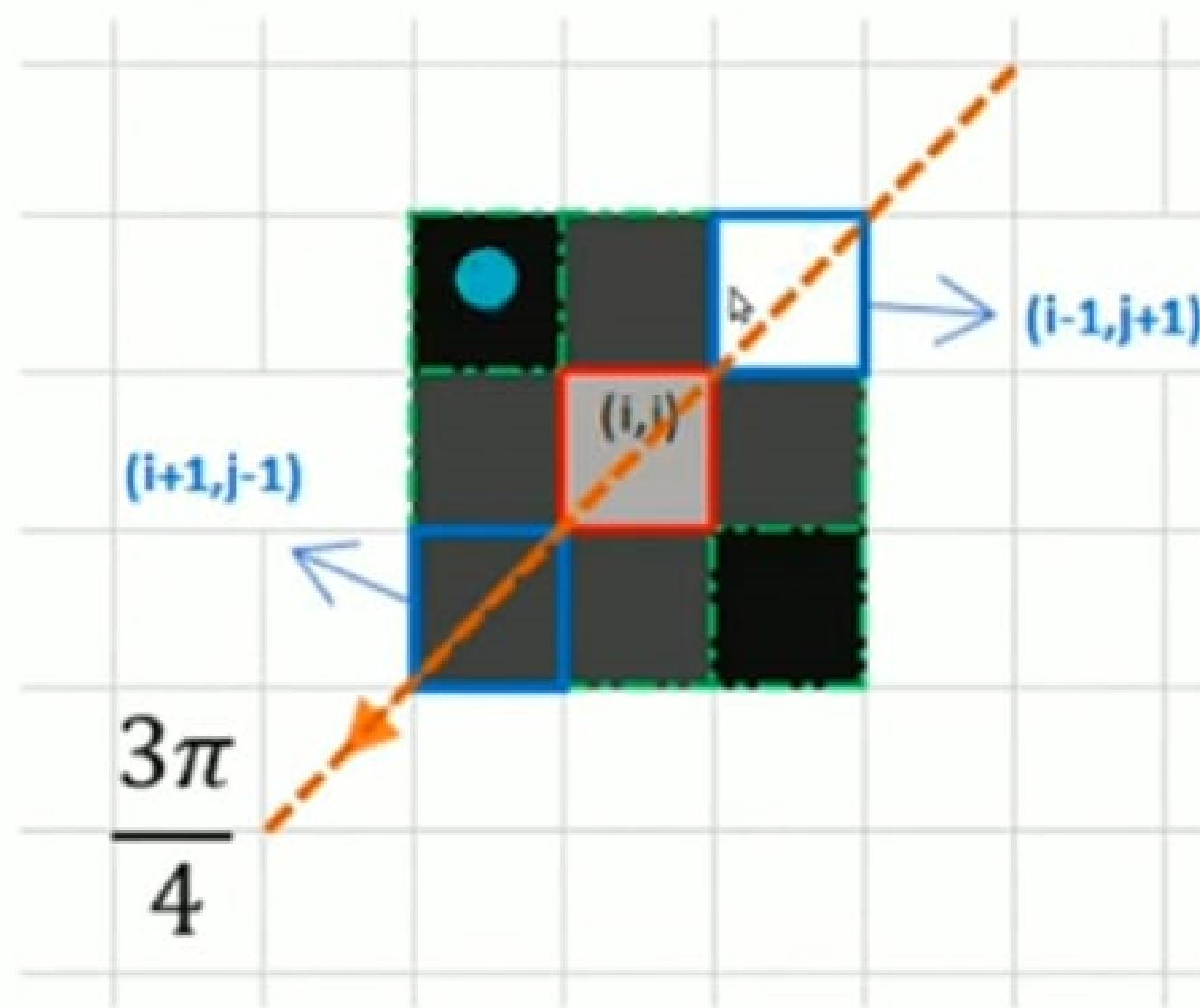
By convoluting the image with  $k_x, k_y$  (3x3) matrices defined by sobel to get result of gradients on x-axis and y-axis.

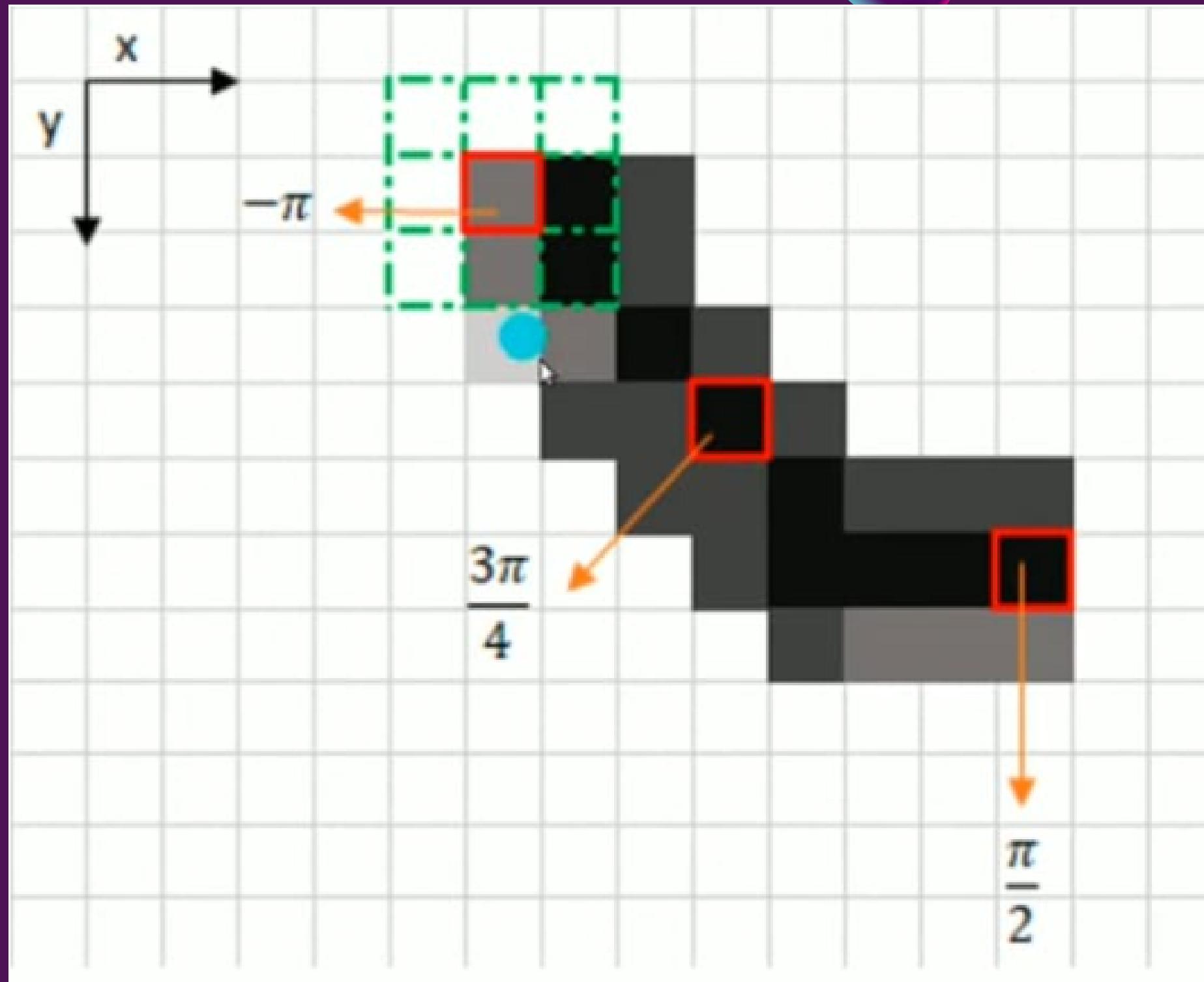
Gradient is defined since to get the points of variation of intensities.



### 3. Non-maximum suppression

This is the main process of edge detection. In this process we will travel through every pixel and using a sliding window and then we use the result of gradient angle to compute the illumination of resulting image in order to detect the edge. it will calculate maximum gradient in the edge direction.





compare the intensities along the direction of edge computed before by using tangent of gradients and check if any of the pixel intensity is higher than the selected pixel then black it out.

# 4. Double Thresholding

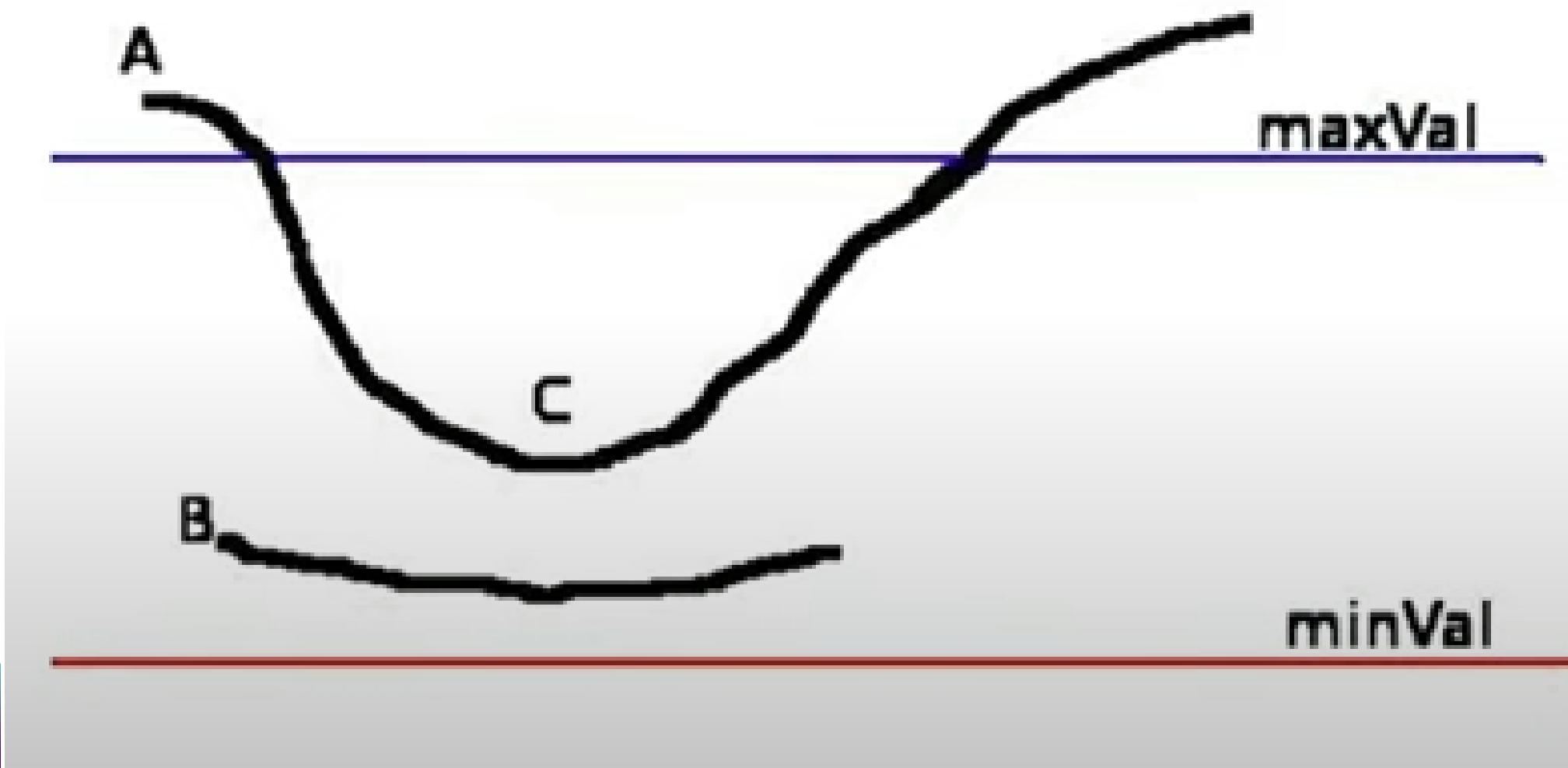
For this step we need two threshold values, minvalue and maxvalue.

Any edges with intensity gradient more than maxvalue are sure to be edges and those below minvalue are non-edges, so discarded.

Those who lie between these two thresholds are classified edges or non-edge based on their connectivity.

# 5. Hysteresis

If they are connected to 'sure-edge' pixels,they are considered to be part of edges.Otherwise , they are also discarded.



# Contour Detection

Contours are the line joining all points along the boundary of image that are having same intensity. They are used in shape analysis , finding size of object of interest and object detection.

in this contour detected features we will localize numberplate firstly all are sorted through area base and then approximated using perimeter and a polygon of four sides .

finally the detected point coordinates are resulted will be our number plate.

THANK YOU