

A decorative graphic on the left side of the slide consisting of two overlapping parallelograms. The front one is blue and the back one is a light green color. They are positioned diagonally, with the blue one in front of the green one.

EE604 Project

Measure the Diameter of an Object in an Image



The goal of the project is to find the diameter of an object in an image. The object will be circular and exactly one in count.



Method 1

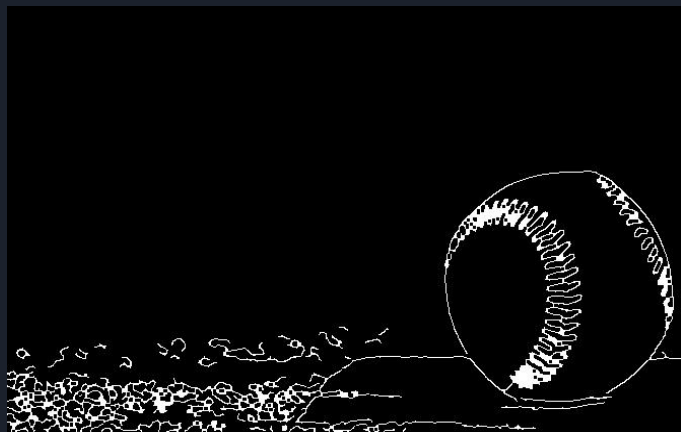
- Convert the image to grayscale.
- Apply smoothing using Gaussian filter.
- Apply Canny edge detector to get the edge map.
- Perform dilation + erosion to close any gaps in the edge map.
- Find contours in the image.
- We may get more than one contour because of noise.
- Fit a minimum area rectangle around all contours and select the best.
- Side length of this rectangle will give us the diameter of image.



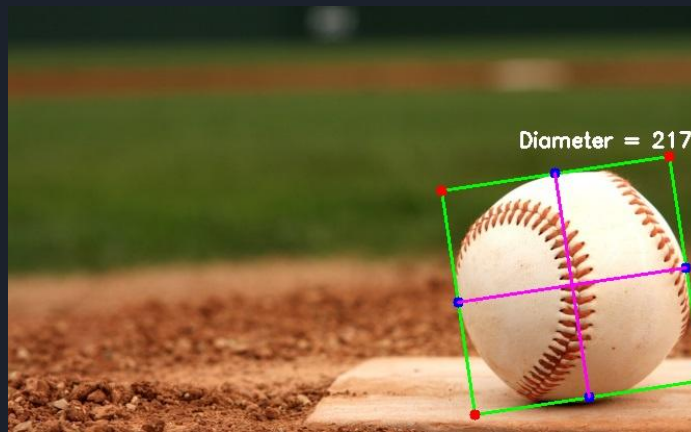
Original Image



Grayscale Image



Edge Map



Output Image



Method 2

In this method we use Hough Circle Transform to detect circle in our image. This makes use of the parametric representation of circle :

$$x = a + R\cos\Theta$$

$$y = b + R\sin\Theta$$

Now for a given radius every point in xy space is a circle in ab space since

$$a = x - R\cos\Theta$$

$$b = y - R\sin\Theta$$



Hough Circle Transform

- Convert the image to grayscale.
- Apply some edge detector and get a binary image
- For every 'edge' pixel get a circle in ab space for a fixed radius value
- For every point on the circle in ab space cast 'votes' in accumulator cells.
- The cell with maximum number of votes is the centre.
- Repeat the algorithm for different radius values.



Reducing background noise

- Gaussian blurring is local to every pixel and hence not very effective .
- Non Local Means Denoising
 - In this method we take a small window around each pixel say 5×5
 - Search for similar patches in the image
 - Replace the value of pixel with the average value of all the windows that we got.



Original Image



Denoised Image



Grayscale Image



Output Image



References

- [Measuring size of objects in an image with OpenCV](#)
- [Detecting Circles in Images using OpenCV and Hough Circles](#)
- [Image Denoising](#)



THANK YOU

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