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Draw a triangle with centroid using OpenCV

Difficulty Level : Medium   •   Last Updated : 18 Dec, 2018

Prerequisite: Geometric shapes using OpenCV

Given three vertices of a triangle, write a Python program to find the centroid of the triangle and then draw the triangle with its centroid on a black window using OpenCV.

Examples:

```
Input: (100, 200) (50, 50) (300, 100)
Output: (150, 116)
```

Libraries Needed:

```
OpenCV
Numpy
```

Approach:

Create a black window with three color channels with resolution 400 x 300. Draw three lines which are passing through the given points using the inbuilt line function of the OpenCV. It will create a triangle on the black window. Find the centroid of the triangle using the following simple formula.

$$(X, Y) = \left\{ \frac{x1 + x2 + x3}{3}, \frac{y1 + y2 + y3}{3} \right\}$$

Draw this centroid on the black window using *circle* function of OpenCV with zero thickness.

```python
import numpy as np
import cv2

# Width and height of the black window
width = 400
height = 300

# Create a black window of 400 x 300
img = np.zeros((height, width, 3), np.uint8)

# Three vertices(tuples) of the triangle
p1 = (100, 200)
p2 = (50, 50)
p3 = (300, 100)

# Drawing the triangle with the help of lines
#  on the black window With given points
# cv2.line is the inbuilt function in opencv library
cv2.line(img, p1, p2, (255, 0, 0), 3)
cv2.line(img, p2, p3, (255, 0, 0), 3)
cv2.line(img, p1, p3, (255, 0, 0), 3)

# finding centroid using the following formula
# (X, Y) = (x1 + x2 + x3//3, y1 + y2 + y3//3)
centroid = ((p1[0]+p2[0]+p3[0])//3, (p1[1]+p2[1]+p3[1])//3)

# Drawing the centroid on the window
cv2.circle(img, centroid, 4, (0, 255, 0))

# image is the title of the window
cv2.imshow("image", img)
cv2.waitKey(0)
```
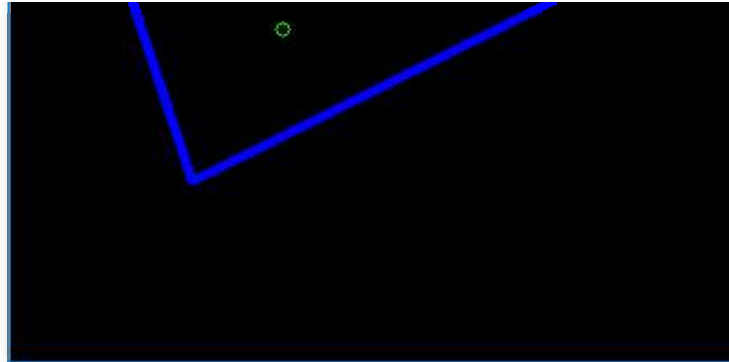
Output:

```
(150, 116)
```

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