

# Contour Based Object Tracking

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**Abstract-** Contour Based Object Tracking is an efficient method for tracking Objects, which can detect multiple objects simultaneously. Contour based object tracking can track the objects in both images and videos. In this method we will find the contours of the objects, then using this contours we will track the objects. Finding the contours is the most important task in the contour based object tracking. Using certain image processing operations we will process the image frames and will find the interesting Objects and their contours. Using these contours we can detect the centroid of the objects, these centroid will represent the object. So we can follow the path of the object very easily. And this contour based object tracking can be used in several computer vision applications.

**Key Words-** Computer vision, Contours, image frames, Object tracking, OpenCV.

## I.INTRODUCTION

Computer vision is a major branch of image processing which is emerging day by day. As we all say computer is not having any intelligence the programmers have to guide the computer to perform operations. As a human our most valuable organ is our eyes. Our vision is the most power full sense. A computer is also having an eye, It's webcam. Using it's own eye we can made the computer to do many operations. This is dealt with computer vision.

Here in this paper I am explaining about contour based object tracking which is based on computer vision. Object tracking can be done using certain image processing operations with the help of contours .For this purpose we can use OpenCV-Python which is a open source software. We know MatLab is well known for image processing. But I can say that these computer vision applications can be develop using Opencv-Python with more ease less complexity and less cost than MatLab.

This contour based object tracking has a list of applications, once you are able to track the objects using contours, Then we can use it for several purposes like human computer interaction, automated surveillance etc.

Here I am explaining about Virtual Mouse which is a human computer interaction and a pharmaceutical inspection system. which uses for finding the packing defects in pharmaceutical companies.

The contour based Object tracking starts with color .detecting the different colors on the video framed is the keystone of contour based object tracking. These video frames should go across several preprocessing activities. The main advantage of using Python-openCV is that it can simplify all the preprocessing activities. There are several predefined libraries are available in OpenCV for performing these operations. These libraries will provide all the functions.

## II .RELATED WORK

Object tracking has passed through several experiments. Many types of algorithms are available for this object tracking. Like Point Tracking algorithms (e.g. Kalman Filter ),Kernel tracking (e.g. Mean shift, KLT tracker),silhouette tracking(e.g. variational methods,condensation algorithm) Etc. and each of these algorithms will track the objects in different manner. And several background subtraction methods are also used for this object tracking. But all method should have to capture the video using the web cam or any video capture equipment. In the area of object tracking most of the applications are developed using MATLAB. All the functions required for the object tracking are readily available.

## III. PROPOSED SYSTEM

Contour based object tracking can track objects in any color. And tracking in both static and dynamic objects is possible. In the case of static images we have to load the images to the program and then using predefined OpenCV functions we can track the object. In the case of video we can do tracking on both live video and recorded video. For recorded video just like in the case of images we have to load it. But for the live video camera calibration is required .that is the web cam can be controlled using the Python-OpenCV code.it will receive the live video from the camera. Only one single function is required for this. That is:

```
cam=cv2.VideoCapture(0)
```

this fuction is the predefined function in OpenCV library for camera calibration. This will simply create the object for the camera and using this object we can control the video capturing and other functions related to the web cam. VideoCapture() can have parameters like 0,1,2 etc..this will represent the camera connected to the computer system.0 is the default system camera. 1 can represent the 1<sup>st</sup> external camera connected to the system and so on.

When the system starts receiving the video it will decompose the video to image frames. All the image processing will take place on these image frames. Each frame will process separately.

Image representation is the first step for the object tracking. When the object is present in the frame it should be represented. The image should be distinguished from the background. The color of the object is the main criteria for identifying the object. Using certain thresholding functions each color object can represent separately in the background. Each color will will be having an upper range and lower range intensity value. And the pixels having

intensity value in between those upper range and lower range will consider as that color.

Approximate Lower range and upper range intensity values of basic colors are:

Color	Lower range	Upper range
Red	[160,170,50]	[179,250,220]
Green	[53,74,160]	[90,147,255]
Blue	[110,50,150]	[130,260,255]
Yellow	[20,100,100]	[30,255,255]

Whenever the objects are detected in the frames a contour will be drawn for the object, that contour will represent the boundary lines of the object. The next step is we have to find out the centroid of the object. for Identifying the coordinates of the centroid we have to find the image moments. Image an image moment is a certain particular weighted average of the image pixels' intensities. So we will consider the area inside the contour for finding the image moments.

Let the image moment inside the contour be M then the coordinates of the centroid can be calculated as follows:

$$cx = \text{int}(M[‘m10’]/M[‘m00’])$$

$$cy = \text{int}(M[‘m01’]/M[‘m00’])$$

once the centroid points are obtained this centroid point will be representing the object so we can put a bounding box for the object with respect to the centroid. The dimensions of the bounding box can be obtain from the contour using the function

```
cv2.boundingRect(contour)
```

it will give all the dimensions of the bounding box. Then draw the bounding box. Now the object is enclosed in the bounding box from frame to frame it can track the object .

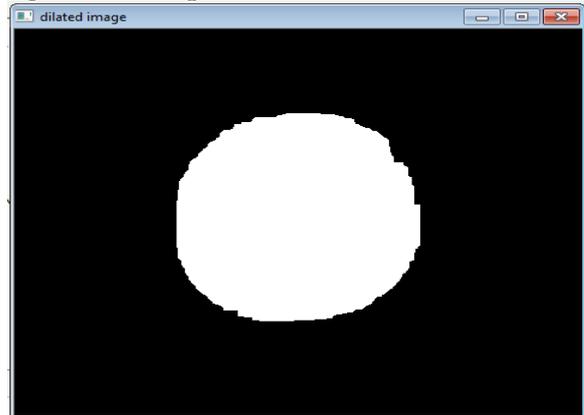
#### IV. EXPERIMENTAL RESULTS

The contour based object tracking for a static image have to go through different steps. And in each step they provide a particular output. The out put each step will be as follows.

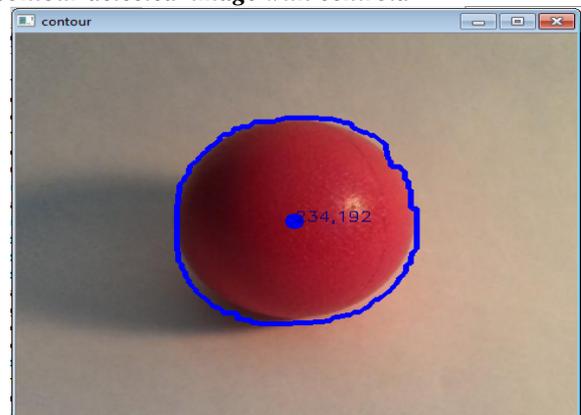
##### 1. Original Image



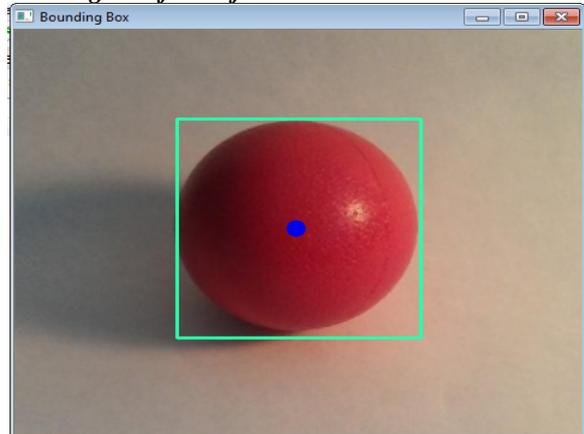
##### 2. Preprocessed image



##### 3. Contour detected image with centroid



##### 4. Bounding Box for Object



#### V. APPLICATIONS

Contour based object tracking is having several applications. The interesting fact is that it's application are there in different fields of technology. Here I am explaining about two applications of contour based object tracking and both are in two different fields. First one is in human computer interaction that is a virtual mouse and second one in manufacturing field that is a pharmaceutical inspection system.

In the case of virtual mouse we need only three different color finger caps. one for mouse movement, one for left click and one for right click. Using the contour based object tracking we will detect the finger caps in the video

frames then we have to control the mouse movements as per the movement of the fingers. And for the mouse click we will detect the presence of some colors.

The mouse movements can be represented using some hexadecimal values. We have to just assign these hexadecimal values as per the finger detection in the frame. The Pharmaceutical inspection system is used for the detection of missing tablets in the tablet strips. It can be used in tablet manufacturing factories. Our object tracking system can track the defected tablet strips. and using a control system they can be removed from the packing section or can be given for repacking.

## VI. CONCLUSION

Computer vision is a widely developing area in the computer world .and the object tracking is an important task in the computer vision .The contour based object tracking is a computer vision application used for tracking multiple objects. Which is very useful in human computer interaction and manufacturing inspection system and in several other areas.The system is developed using the open source software python and openCV so it is cost effective and efficient and it is open for further developments.

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