Guided Projects Artificial Intelligence & Machine Learning

Guided Projects: Unsupervised Learning

Mean-Shift: Single Object Tracking in Images

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Course	AI and ML (Batch 5)
Problem Statement	Perform object tracking in a video using mean shift object tracking algorithm.

Software requirements prerequisites

Anaconda

Python 3.8

Python Packages

OpenCv

NumPy

Matplotlib

Steps

1. **Take the first frame of the video**

```
In [7]:
1 cap = cv.VideoCapture('slow_traffic_small.mp4')
2 ret,frame = cap.read()
3 frame.shape

Out[7]: (360, 640, 3)
```

2. **Use Contour methods to identify the object**

```
#Convert into gray scale image
img_grey = cv.cvtColor(frame,cv.COLOR_BGR2GRAY)
plt.imshow(img_grey,cmap = 'gray')
plt.show()
```

```
#set a thresh
thresh = 230
#get threshold image
ret,thresh_img = cv.threshold(img_grey, thresh, 255, cv.THRESH_BINARY)
#find contours
contours, hierarchy = cv.findContours(thresh_img, cv.RETR_TREE, cv.CHAIN_APPROX_NONE)
```

3. Identify the Max Contour Area

In [11]:
```
#Identify the contouur which has maximum area
max_contour = contours[0]
for contour in contours:
    if cv.contourArea(contour)>cv.contourArea(max_contour):
        max_contour=contour

    contour=max_contour
    approx=cv.approxPolyDP(contour, 0.1*cv.arcLength(contour,True),True)
    x,y,w,h=cv.boundingRect(approx)
```

4. Mark the area of interest

Mark the region of interest(ROI)

In [12]:
```
# estimate the boundaries points
x1, y1, x2, y2 = x-50,y-35,x+w+20,y+h+50
cv.rectangle(frame,(x1,y1),(x2,y2),(0,255,0),4)
plt.imshow(frame)

```

Out[12]: <matplotlib.image.AxesImage at 0x193054c1790>

5. Calculate the histogram of the ROI

In [16]:
```
track_window = (x1,y1,x2,y2)
roi = frame[y1:y2, x1:x2]
hsv_roi =  cv.cvtColor(roi, cv.COLOR_BGR2HSV)
mask = cv.inRange(hsv_roi, np.array((0., 60.,32.)), np.array((180.,255.,255.)))
roi_hist = cv.calcHist([hsv_roi],[0],mask,[180],[0,180])
cv.normalize(roi_hist,roi_hist,0,255,cv.NORM_MINMAX)
```

6. Perform object Tracking

In [18]:

```
ret = True

while ret==True:
    ret, frame = cap.read()

    if ret == True:
        hsv = cv.cvtColor(frame, cv.COLOR_BGR2HSV)
        dst = cv.calcBackProject([hsv],[0],roi_hist,[0,180],1)

        # apply meanshift to get the new location
        ret, track_window = cv.meanShift(dst, track_window, term_crit)

        # Draw it on image
        x,y,w,h = track_window
        img2 = cv.rectangle(frame, (x,y), (x+w,y+h), 255,2)
        cv.imshow('img2',img2)

        k = cv.waitKey(1)
        if k==ord("q") or ret == False:
            break

```