Alphabet Ball Detection using OpenCV Sai Kiran Reddy Mekala

Step1: Get frames from the Video and obtain parameters like fps(Frames Per Second), Duration of Video, Total No.of Frames.

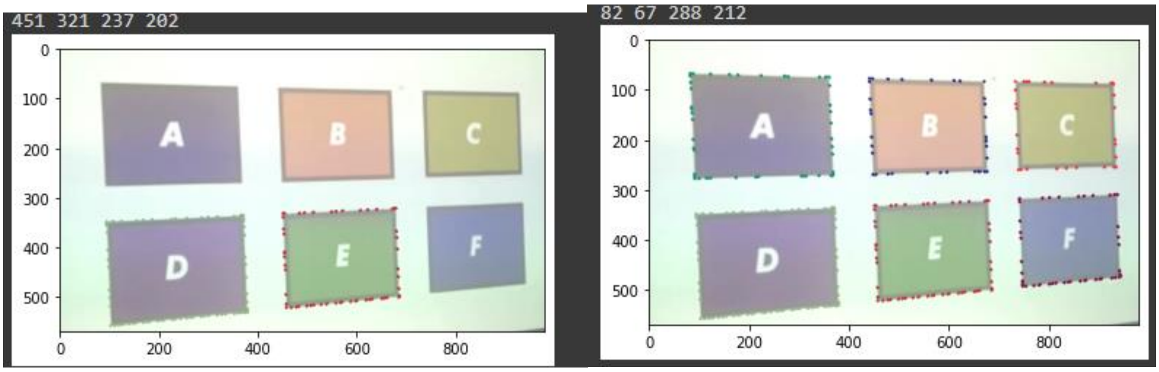
Step2:Calculate the Bounding Boxes for the alphabet boxes using findContours function.

As the boxes are Rectangular in shape, I used SOBEL-X and SOBEL-Y (horizontal and vertical filters) to determine the edges.

Use different colors to mark the contours we can identify the alphabets.

Drawback: I have noted the bounding boxes manually, but we use AI alphabet detection model by passing the cropped image of the bounding boxes.

Note these values in a dictionary



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451 321 237 202
```

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82 67 288 212
```

Bounding boxes for “E”,”A” values as x,y,w,h respectively.

Step 3: Calculate the differences between adjacent frames so we can know the ball movement.

a. Use threshold between 130-250 to remove the shadow of the ball.(Found after trail and error)

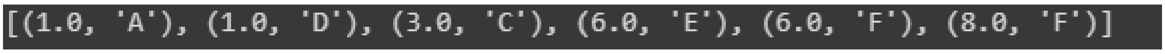
b. Use Dilation to improve the ball radius as it get distorted because of projector lights.

c. Use find contours and use constraint ContourArea that helps detecting ball leaving unuseful things.

d. Note down the dimensions along with the frame number.

Step4: Check if the ball Lies inside the Bounding area of alphabet.

Step 5: Print the output.



```
[(1.0, 'A'), (1.0, 'D'), (3.0, 'C'), (6.0, 'E'), (6.0, 'F'), (8.0, 'F')]
```

Drawbacks:

1. The video is inclined at an angle with respect to wall. Would have beem perpendicular to wall.
2. The ball is not of bright color to differentiate from the background.
3. The projector causes shadow of ball which cause model to detect that also a ball.(Some how removed by thresholding).

Improvements:

1.There can be a lot of improvements:

a. By continuously tracking the ball center co-ordinates we can come to know when the ball changed its direction there by understanding it had hit the wall.

2. Using the AI model of alphabet detection if different alphabets are passed.