Global Academy of Technology

Department Of Electronics and Communication Engineering

Report On

PYTHON MINI PROJECT

VI Semester
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TITLE: DOCUMENT SCANNER USING OPENCV

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AIM / Objective of the Project:

To build a Document Scanner using OpenCV and Python. And simulate the program and verify the results.

SYSTEM REQUIREMENTS:

Python [3.7.6], PyCharm, OPENCV Library, Web Camera.

INTRODUCTION:

Optical character recognition or optical character reader (OCR) also known **Document scanner** is the electronic or mechanical conversion of images of typed, handwritten or printed text into machine-encoded text, whether from a scanned document, a photo of a document, a scene-photo (for example the text on signs and billboards in a landscape photo) or from subtitle text superimposed on an image (for example: from a television broadcast).

Widely used as a form of data entry from printed paper data records – whether passport documents, invoices, bank statements, computerized receipts, business cards, mail, printouts of static-data, or any suitable documentation – it is a common method of digitizing printed texts so that they can be electronically edited, searched, stored more compactly, displayed on-line, and used in machine processes such as cognitive computing, machine translation, (extracted) text-to-speech, key data and text mining. OCR is a field of research in pattern recognition, artificial intelligence and computer vision.

C0NCEPT OF PROJECT:

1. Read the photograph or image: If image's dimensions are on higher side, you might prefer to scale it down for faster processing and to resize it in current window.

2. Identify the edges: To do this we might have to convert it to gray to reduce any colour noise. To remove any high frequency noise, we will blur the image a bit. This will help in detecting contours.

3. Detect document edges in the image: This will outline the region-of-interest in image. We would be able to see the outline of our document in this step.

4. Identify and extract document boundary/edges: In this most code intensive part, we will classify each of the coordinate as per its corner and will calculate document dimensions.

5. Apply perspective transform: To obtain a top-down, "bird-eye-view" of the document, we will transform the extracted region-of-interest into required perspective.

6. Final steps: Here we will prepare image for final display. This step might be optional and it totally depends how you wish to see your document or want to apply any transformation such as black-and-white or increase contrast etc.

PROGRAM:

```
import cv2
import numpy as np

#####################################
widthImg = 540
heightImg = 640
#####################################

cap = cv2.VideoCapture(1)
cap.set(10, 150)


def preProcessing(img):
    imgGray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)
    imgBlur = cv2.GaussianBlur(imgGray, (5, 5), 1)
    imgCanny = cv2.Canny(imgBlur, 200, 200)
    kernel = np.ones((5, 5))
    imgDial = cv2.dilate(imgCanny, kernel, iterations=2)
    imgThres = cv2.erode(imgDial, kernel, iterations=1)
    return imgThres


def getContours(img):
    biggest = np.array([])
    maxArea = 0
    contours, hierarchy = cv2.findContours(img, cv2.RETR_EXTERNAL,
cv2.CHAIN_APPROX_NONE)
    for cnt in contours:
        area = cv2.contourArea(cnt)
        if area > 5000:
            # cv2.drawContours(imgContour, cnt, -1, (255, 0, 0),
3)
            peri = cv2.arcLength(cnt, True)
            approx = cv2.approxPolyDP(cnt, 0.02 * peri, True)
            if area > maxArea and len(approx) == 4:
                biggest = approx
                maxArea = area
    cv2.drawContours(imgContour, biggest, -1, (255, 0, 0), 20)
```

```
    return biggest
```

```
def reorder(myPoints):
    myPoints = myPoints.reshape((4, 2))
    myPointsNew = np.zeros((4, 1, 2), np.int32)
    add = myPoints.sum(1)
    # print("add", add)
    myPointsNew[0] = myPoints[np.argmin(add)]
    myPointsNew[3] = myPoints[np.argmax(add)]
    diff = np.diff(myPoints, axis=1)
    myPointsNew[1] = myPoints[np.argmin(diff)]
    myPointsNew[2] = myPoints[np.argmax(diff)]
    # print("NewPoints",myPointsNew)
    return myPointsNew


def getWarp(img, biggest):
    biggest = reorder(biggest)
    pts1 = np.float32(biggest)
    pts2 = np.float32([[0, 0], [widthImg, 0], [0, heightImg],
[widthImg, heightImg]])
    matrix = cv2.getPerspectiveTransform(pts1, pts2)
    imgOutput = cv2.warpPerspective(img, matrix, (widthImg,
heightImg))

    imgCropped = imgOutput[20:imgOutput.shape[0] - 20,
20:imgOutput.shape[1] - 20]
    imgCropped = cv2.resize(imgCropped, (widthImg, heightImg))

    return imgCropped


def stackImages(scale, imgArray):
    rows = len(imgArray)
    cols = len(imgArray[0])
    rowsAvailable = isinstance(imgArray[0], list)
    width = imgArray[0][0].shape[1]
    height = imgArray[0][0].shape[0]
    if rowsAvailable:
        for x in range(0, rows):
            for y in range(0, cols):
```

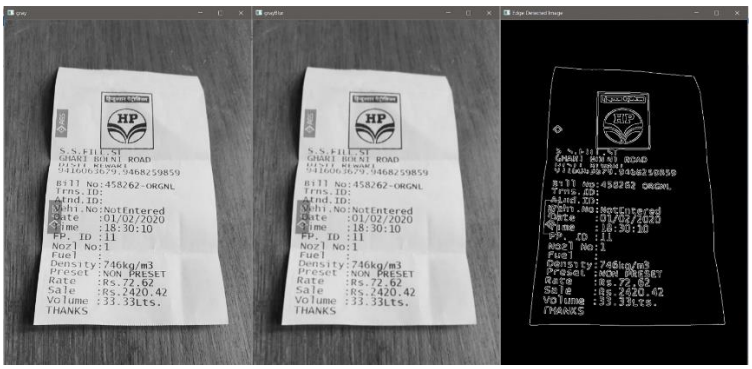
```
                if imgArray[x][y].shape[:2] ==
imgArray[0][0].shape[:2]:
                    imgArray[x][y] = cv2.resize(imgArray[x][y],
(0, 0), None, scale, scale)
                else:
                    imgArray[x][y] = cv2.resize(imgArray[x][y],
(imgArray[0][0].shape[1], imgArray[0][0].shape[0]),
                                                None, scale,
scale)
                if len(imgArray[x][y].shape) == 2: imgArray[x][y]
= cv2.cvtColor(imgArray[x][y], cv2.COLOR_GRAY2BGR)
        imageBlank = np.zeros((height, width, 3), np.uint8)
        hor = [imageBlank] * rows
        hor_con = [imageBlank] * rows
        for x in range(0, rows):
            hor[x] = np.hstack(imgArray[x])
        ver = np.vstack(hor)
    else:
        for x in range(0, rows):
            if imgArray[x].shape[:2] == imgArray[0].shape[:2]:
                imgArray[x] = cv2.resize(imgArray[x], (0, 0),
None, scale, scale)
            else:
                imgArray[x] = cv2.resize(imgArray[x],
(imgArray[0].shape[1], imgArray[0].shape[0]), None, scale, scale)
            if len(imgArray[x].shape) == 2: imgArray[x] =
cv2.cvtColor(imgArray[x], cv2.COLOR_GRAY2BGR)
        hor = np.hstack(imgArray)
        ver = hor
    return ver


while True:
    success, img = cap.read()
    img = cv2.resize(img, (widthImg, heightImg))
    imgContour = img.copy()

    imgThres = preProcessing(img)
    biggest = getContours(imgThres)
    if biggest.size != 0:
        imgWarped = getWarp(img, biggest)
        # imageArray = ([img,imgThres],
        #           [imgContour,imgWarped])
        imageArray = ([imgContour, imgWarped])
```

```
        cv2.imshow("ImageWarped", imgWarped)
    else:
        # imageArray = ([img, imgThres],
        #               [img, img])
        imageArray = ([imgContour, img])

    stackedImages = stackImages(0.6, imageArray)
    cv2.imshow("WorkFlow", stackedImages)

    if cv2.waitKey(1) and 0xFF == ord('q'):
        break
```

Simulated Output:

STEP 1:

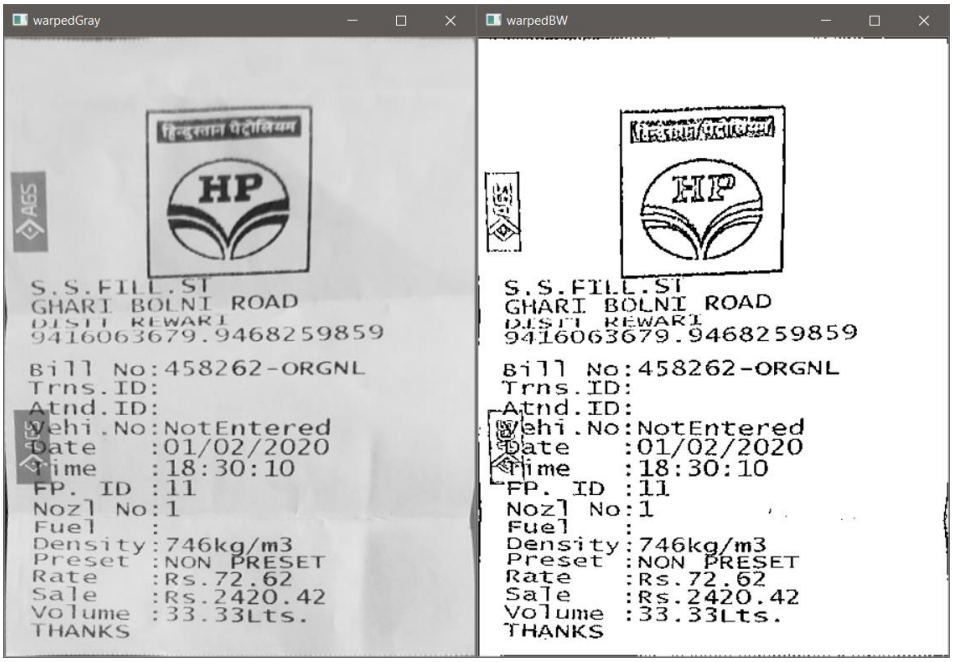
STEP 2:



STEP 3:

STEP 5:

STEP 6:



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