ProductizeTech

AI Engineer - Computer Vision & NLP - Full Time Hiring Assignment

Read “Assignment Submission” at the end of this document before proceeding with the assignment.

Note - The Assignment will take 2 to 3 hrs to complete. Many candidates won’t be able to complete the task. Please take up this assignment as a fun challenge!

Watch the video “Assignment Explanation.mp4” in the drive. It contains the explanation of the assignment.

1. **Task 1: Automatic Object Outline/Border Detection (Development) (15 Points)**

Develop a basic OpenCV Python script that draws an object’s outline using rembg library & OpenCV Image processing.

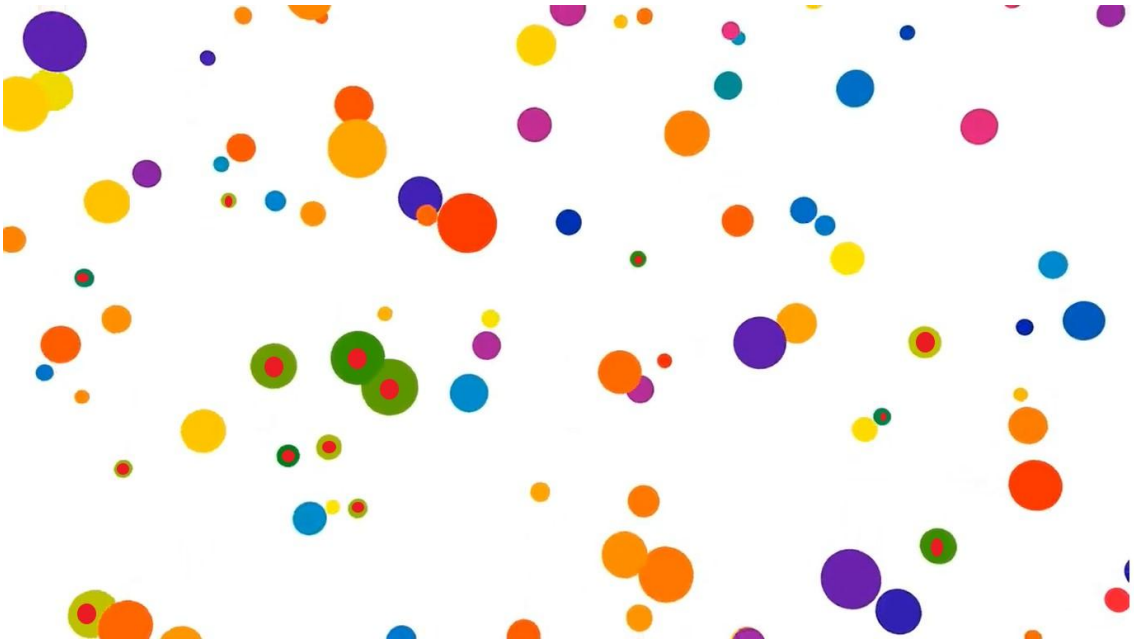
a. In the Python script add a variable to specify the input image path.
b. The script should read the image & display it.
c. Ask the user to draw a rectangle over an object inside the image. (cv2.selectROI)
d. Crop the selected Region Of Interest (ROI) and pass it to rembg library. (https://github.com/danielgatis/rembg) [pip install rembg]
e. The library will remove the background from the ROI and return the image back.
f. Draw an outline over the object since it doesn’t have any background now.

g. Overlay the object outline in the original input image and show it as output.
h. Allow the user to do this again and again until “q” is pressed.
i. To clear the outline, allow the user to press “c”

Submission -

j. Screen record using Loom/OBS/Any Other Software and run your script on “1.jpg” & “2.jpg” in the “TEST IMAGES” folder.
k. Draw a box over the women in red pants for “1.jpg”
l. Draw a box over the car for “2.jpg”

2. **<u>Task 2: Draw Red Dot On Green Polka Dots (Development) (10 Points)</u>**
    a. The input video for this task is “task_2_video.mp4”
    b. In this task, detect the green polka dots in the video. (HSV filtering)
    c. You can hardcode the HSV range values for the green color.
    d. Draw a red dot at the center of each green polka dot.
    e. Do this for all the frames in the video and generate an output video.
    f. You can consider both the green dots (Dark & Light) or any one of them.
    g. You can keep the size of the red dot the same for all the green dots.
    h. Output example of a single frame -



i. Write an algorithm to output such red dots drawn at the center of the green dots.
j. If 2 green dots overlap, you can draw a single red dot or 2 whichever you feel is easier for you.

3. **<u>Task 3: EasyOCR (Development) (7 Points)</u>**
   a. For this task, use the EasyOCR library in Python.
   b. Write a program in Python OpenCV to read all the image files in a folder.
   c. For each file, run the EasyOCR library and store all the output images in a folder
   d. Input images will look like “task_3_input.jpg”
   e. The output image should look like “task_3_partial_output.png” but in place of red boxes with numbers, it should be red boxes with green-colored OCR detected text beside it. Example is given for “DOB 03/05/1960” in the “task_3_partial_output.png”
   f. Develop this algorithm and run it on all the images inside “License Images.zip”.
   g. Store all the output images in a folder named “License Outputs” and upload the folder to your submission drive

folder. Do not zip the “License Outputs” folder. The images should be viewable directly on Google Drive.

h. Upload your .py file to your Google Drive folder.

4. **Task 4: MediaPipe Pose Estimation (Inference) (5 Points)**
    a. The input video for this task is “task_4_video.mp4”
    b. Draw the person’s skeleton in the video using MediaPipe Library
    c. This task is just to check if you’re able to use MediaPipe pose estimation for inference.
    d. This is a pose estimation task and **not** face key point detection.

Assignment Submission -

1. Your shared folder in Google Drive will contain the following -
    a. Task 1 -
        i. “task_1_code.py” - Python code for border detection.
        ii. “task_1_demo.mp4” - Screen recording of the script running on “TEST IMAGES”
    b. Task 2 -
        i. “task_2_output.mp4” - Output video generated by running the polka dots detection script
        ii. “task_2_code.py” - Python code for polka dots detection
    c. Task 3 -
        i. “License Outputs” - This folder will contain the output images for the EasyOCR task.
        ii. “code_task_3.py” - Python code for EasyOCR Task
    d. Task 4 -
        i. “output_task_4.mp4” - Output video of MediaPipe task

    ii. “code_task_4.py” - Python code for MediaPipe Task
2. Do **NOT** zip the files and upload them. Assignments that are zipped won’t be considered.
3. The Google Drive folder link should be set to "Anyone with the link can view". Without this, your submission won't be accepted.

All the best!