Quiz 2

Digital image processing Lab

CEL 444

Name: Enrolment #:

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Instructions:

- You have **30 minutes** to complete and submit this quiz. Ensure you submit your work on the LMS (Learning Management System**)** before the deadline, as late submissions will not be accepted.
- Your submission must include your code and screenshots.
- The use of AI tools or automated coding is strictly prohibited. Any detection of AI-generated content will result in an **"F" grade for the entire course**.
- Ensure your code is properly commented and reflects your understanding of the concepts.

Question:

Write a Python script that applies a green screen effect to an image. Using OpenCV, the script should read two images: one with a green background (foreground image) and another to use as the new background. The task is to replace the green pixels in the foreground image with the corresponding pixels from the background image and display the final result using OpenCV. You can achieve this by using color thresholding to identify and mask the green pixels in the foreground image.

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In [16]: import cv2
         import numpy as np

         subject = cv2.imread("catTransparent.jpg")
         background = cv2.imread("hellBackground.jpg")

         # resizing to match the images
         frame = cv2.resize(subject, (640, 480))
         image = cv2.resize(background, (640, 480))

         # adjusted green color range
         lower_green = np.array([35, 40, 40])
         upper_green = np.array([85, 255, 255])

         # Converting the frame to HSV color space for better color detection
         hsv = cv2.cvtColor(frame, cv2.COLOR_BGR2HSV)
         mask = cv2.inRange(hsv, lower_green, upper_green)

         # Improve the mask using morphological operations
         mask = cv2.morphologyEx(mask, cv2.MORPH_OPEN, np.ones((3, 3), np.uint8))
         mask = cv2.morphologyEx(mask, cv2.MORPH_DILATE, np.ones((3, 3), np.uint8))

         # Create the inverse mask
         mask_inv = cv2.bitwise_not(mask)

         # Use the mask to extract the foreground (original frame) and the background (replacement image)
         fg = cv2.bitwise_and(frame, frame, mask=mask_inv)
         bg = cv2.bitwise_and(image, image, mask=mask)

         # Combine the foreground and background
         final = cv2.add(fg, bg)

         # Concatenate the original frame and the final output side by side/""online find""
         combined = np.hstack((frame, final))

         cv2.imshow("Original and edited", combined)
         cv2.waitKey(0)
         cv2.destroyAllWindows()
```

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In [ ]:
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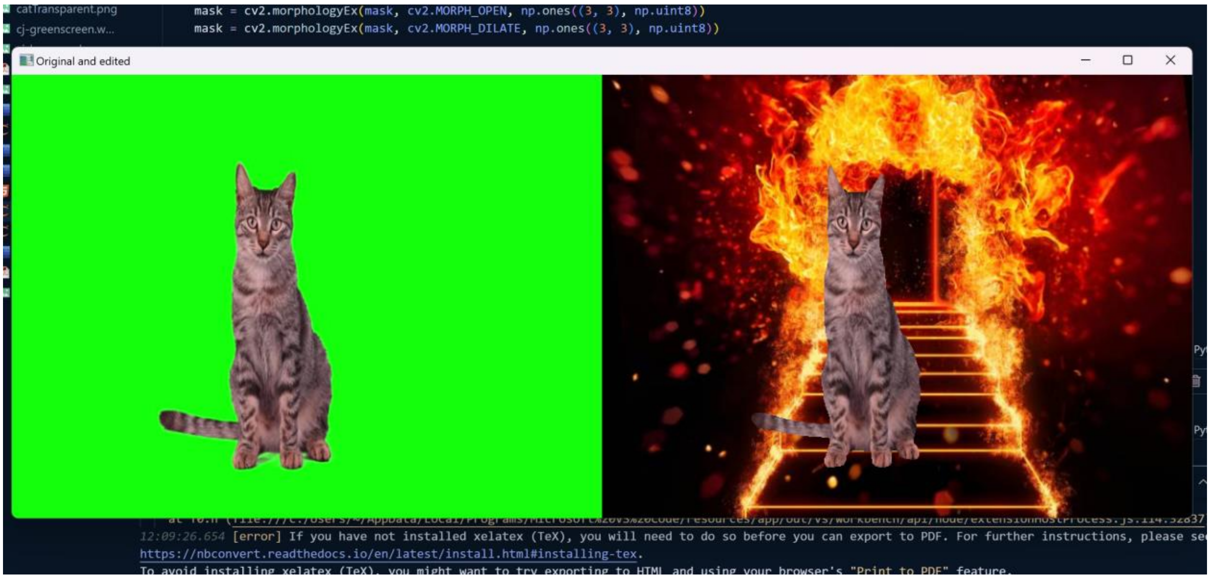

```
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```

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12:09:26.654 [error] If you have not installed xelatex (TeX), you will need to do so before you can export to PDF. For further instructions, please se
https://nbconvert.readthedocs.io/en/latest/install.html#installing-tex.
To avoid installing xelatex (TeX), you might want to try exporting to HTML and using your browser's "Print to PDF" feature.
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