CSC360 - Image Processing - Fall 2023

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Image Processing

Lab 1 - PT1

Basics

Opencv and Python: Basic Image Manipulation:

1. **Read Image** - *cv2.imread(path, coloured/unchanged/grayscale)*
2. **Show Image** - *cv2.imshow(window name, img)*
3. **Write Image** - *cv2.imwrite(path and file name, img)*
4. **Keep windows open** - *cv2.waitKey(0)*
5. **Destroy windows when terminating** - *cv2.destroyAllWindows()*

Opencv and Python: Basic Video Manipulation (Camera):

1. **Read Video** - *cap = cv2.VideoCapture(device)*
2. **Check if device is open** - *cap.isOpened()*
3. **Show Video Frame** - *cv2.imshow(window name, frame)*
4. **Exit to close camera** - *cv2.waitKey(0)*
5. **Release the capture** - *cap.release()*
6. **Destroy windows when terminating** - *cv2.destroyAllWindows()*

Image Enhancement: Conversion To Grayscale:

```
import cv2
import numpy as np

img = cv2.imread('test.jpg',cv2.IMREAD_UNCHANGED)
img_gray = cv2.cvtColor(img, cv2.COLOR_BGR2GRAY)

img_gray_manual = np.zeros(img.shape,img.dtype)

for row in range(img.shape[0]):
    for col in range(img.shape[1]):
        px=img[row,col]
        b,g,r=px

        img_gray_manual[row,col]=b/3+g/3+r/2

cv2.imshow('original', img)
cv2.imshow('gray', img_gray)
cv2.imshow('gray manual', img_gray_manual)

cv2.waitKey(0)  # Waits forever for user to press any key
cv2.destroyAllWindows()  # Closes displayed windows
```

Image Enhancement:

- **Filtering**

```
import cv2

img = cv2.imread('Moon.png',cv2.IMREAD_UNCHANGED)

median = cv2.medianBlur(img,5)

cv2.imshow('original', img)
cv2.imshow('median', median)

cv2.waitKey(0)  # Waits forever for user to press any key
cv2.destroyAllWindows()  # Closes displayed windows
```

- **Edge Detection**

```
import cv2

img = cv2.imread('Moon.png',cv2.IMREAD_GRAYSCALE)

# input image, threshold 1 Lower, threshold 2 Upper
edges = cv2.Canny(img, 100, 200)

cv2.imshow('Original', img)
cv2.imshow('edges', edges)

cv2.waitKey(0)  # Waits forever for user to press any key
cv2.destroyAllWindows()  # Closes displayed windows
```