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import cv2
import numpy as np

def histogram_equalization(img):
    height, width = img.shape
    level = np.zeros(256)

    # histogram
    for x in range(width):
        for y in range(height):
            level[img[y,x]] = float(level[img[y,x]]) + 1.0

    # normalize & CDF
    for i in range(256):
        level[i] = level[i] / float(width*height)
        if i>0:
            level[i] = level[i-1] + level[i]

    # output gray level
    for i in range(256):
        level[i] = round(level[i] * 255.0)

    # set output image
    for x in range(width):
        for y in range(height):
            img[y,x] = level[img[y,x]];

    return img

in_image = cv2.imread('dgu_night.png', 0) # img2numpy
cv2.imshow('dgu_night', in_image)

out_image = histogram_equalization(in_image)
cv2.imshow('dgu_equalize', out_image)

cv2.imwrite('dgu_equalize.png', out_image) # save result img
cv2.waitKey()

```

