**How to Run:**

“classify\_and\_dehaze(img)” is the main function for image dehazing. It takes in an RGB image that is hazy and dehazes it using either the Dark Channel Prior method or RETINEX method depending on whether it is detected to be on land or underwater. You can run this function or the code just above it that tests this function with some saved test data. For our test results, we ran this function on a series of test images and have shown a sample of the results in the report.

“RETINEX\_BASED(img)” is the main function of RETINEX dehazing method for underwater images and an RGB image is supplied and the dehazed RGB image is outputted.

# Input: im - image with RGB channels (sequence is RGB) bounded in [0,1]

# Output: im\_ - image with RGB channels (sequence is RGB) bounded in [0,1]

“haze\_removal\_using\_dark\_channel\_prior(img)” is the main function of Dark Channel Prior dehazing method for land images and an RGB image is supplied and the dehazed RGB image is outputted.

# Input: image - image with RGB channels

# Output: image\_ - dehazed image with RGB channels

Evaluation

For evaluating the effectiveness of dehazing the input images, we have two functions “evaluation\_e(original, dehaze)” and “evaluation\_sigma(original, dehaze, threshold\_upper=250, threshold\_lower=10)”. “evaluation\_e” represents how many new edges are detected where a higher value represents better dehazing. “evaluation\_sigma” evaluates how many pixels are oversaturated and a lower value represents better dehazing.

evaluation\_e:

# input: original & dehaze image

# output: evaluation e value

evaluation\_sigma:

# input: original & dehaze should be in RGB sequence

# threshold\_uppor: values large than it are regarded as saturated (black)

# threshold\_lower: values smaller than it are regarded as saturated (white)

# output: evaluation sigma value

**Data Files:**

The data file resides in a folder called “CS445\_Data” and is externally linked to the Drive in which the colab is mounted. The link for the data (shared access): <https://drive.google.com/drive/folders/1eGwCdjslzm0a5SKiIQMhgKlYHT_65cIb?usp=share_link>. Please note that you must use an Illinois account to access it. Furthermore, please click “Add shortcut to Drive” for the entire folder and place it in your Google Drive to be used by the Colab file.

Within “CS445\_Data” there is a “Inputs” folder for inputs to the neural network, “other inputs” folder for other test inputs, and an “Outputs” folder for the output of the dehazed images.