**ECEN 642, Fall 2019**

Texas A&M University

Electrical and Computer Engineering Department

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Project Report

**Hazer Removal Using Dark Channel Prior**

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**Aggie Code of Honor**

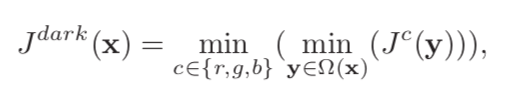
**An Aggie does not lie, cheat or steal or tolerate those who do.**



Abstract

Methods

First we calculated the dark channel image using the equation 1. In the first stage we perform a min filter with a 15 by 15 window all color channel independently. In the next we perform a second min operator on the whole image base on the color dimension of the image. The stage of the process can be seen in Figure 1.



Equation 1 (Dark channel equation)

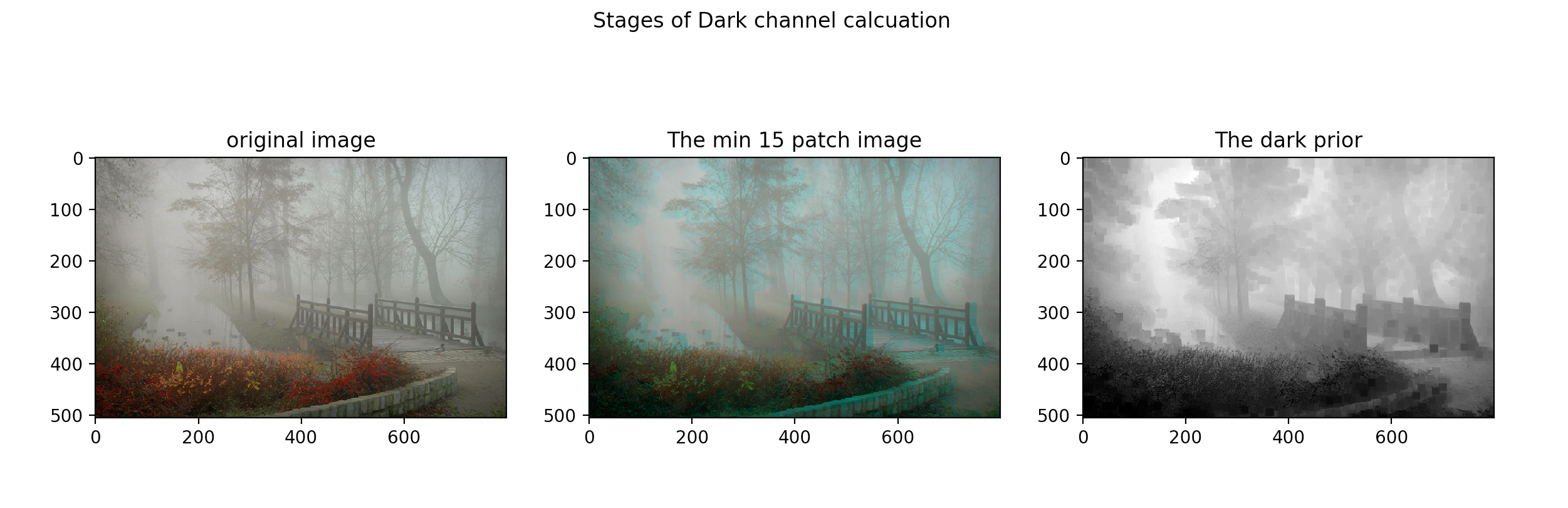
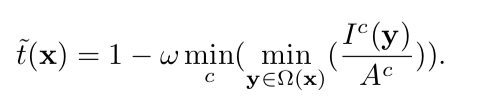


Figure 1 (Dark Channel Stages)

The next stage of the project is to extract an estimate of the atmospheric light of the original image. In the past the brightest pixel is used as the estimate values. This approach does not work for real world images, because there may be white objects present in the image. To avoid this problem one can used the information present in dark prior channel. We find the top 0.1% brightest pixels in the dark prior image. The pixel with highest intensity in this pool is used as the estimate for the atmospheric light. One can use equation 2 and the value of the atmospheric light to extract a Transmission map.



Equation 2(Used to estimate the Transmission map)

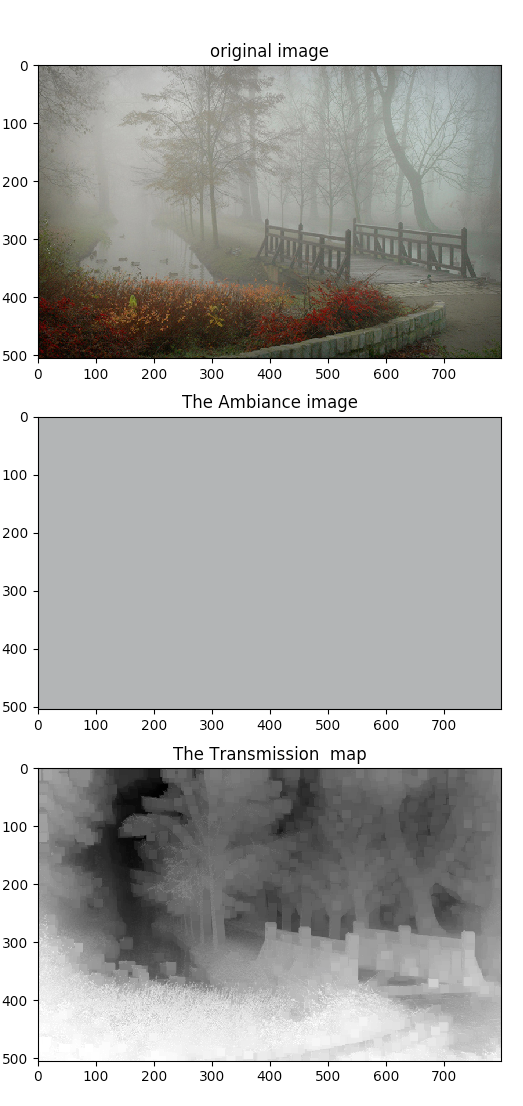
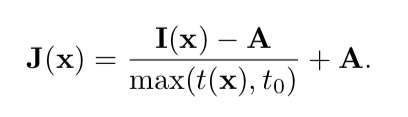


Figure 2 (The estimate of Ambiance and Transmission map)

After having good estimate for the transmission map one can use equation 3 to recover the original image. The denominator of the equation has a lower bound, because the original image is prone have noise and small amount of haze are preserved in areas with thick haze.



Equation 3 (Used to recover the haze image)

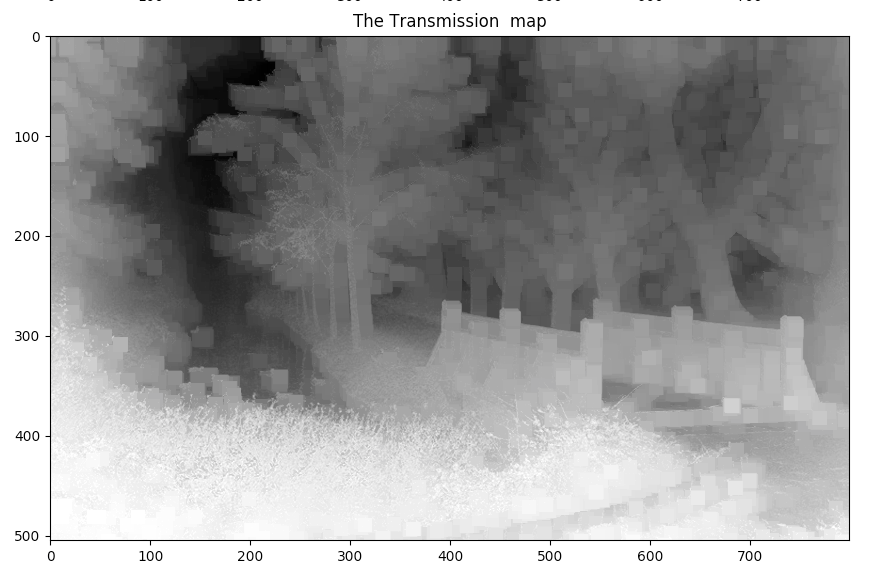


Figure 3 (The Transmission estimate of the image)

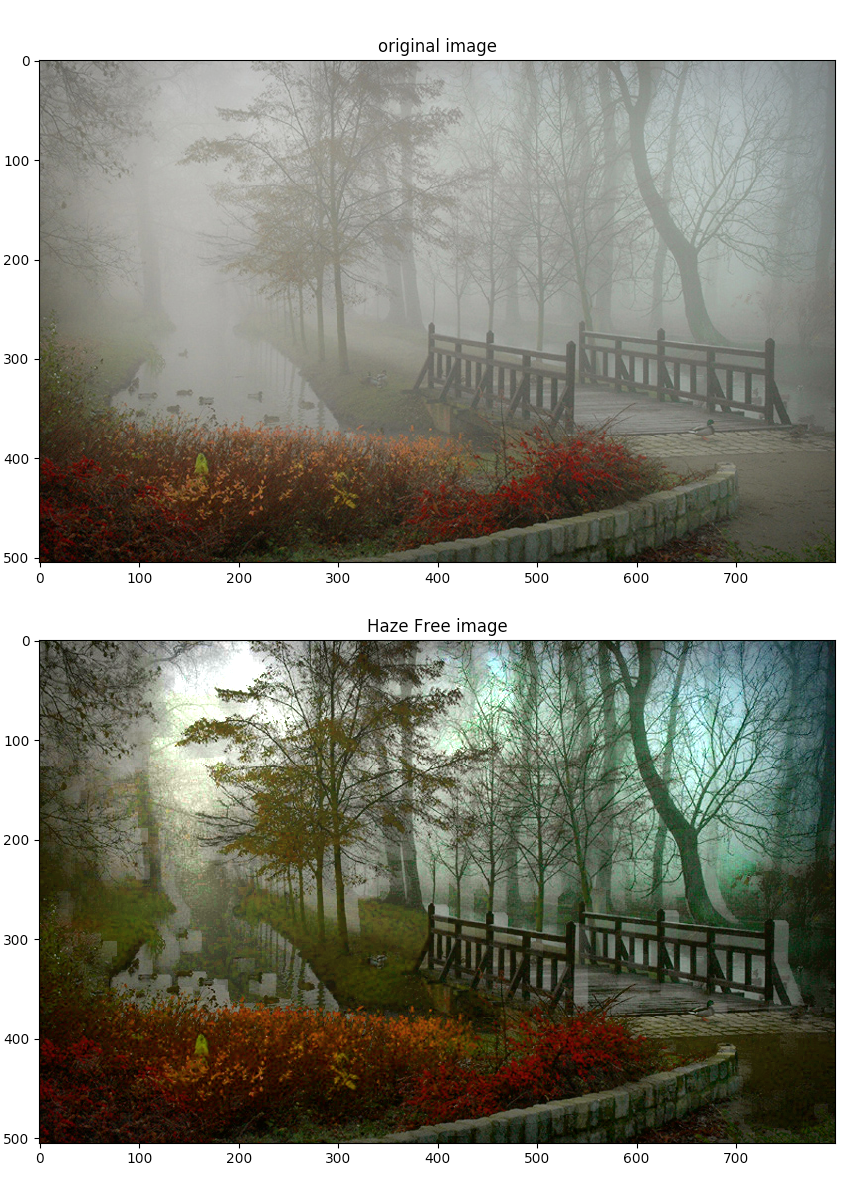


Figure 4 (Original and Recovered image)

Results

Conclusion