

Mobile Haze Removal Application

Holly Chiang hchiang1@stanford.edu

Yifan Ge gyifan@stanford.edu

Motivation

In the last couple decades, China has developed its economy by largely expanding heavily polluting industries. Public concern over the environmental consequences of this growth has exploded in recent years. China's hyperactive microblogs logged 2.5m posts on "smog" in a single month in 2013^[1]. Hazy images of Chinese cities went viral online and have come to represent the severe pollution in China. The generation that born after 2000 have probably never seen a unpolluted China. In this project, we would like to build a mobile haze removal application that gives users a different angle to see China. By removing the haze and reconstructing a clear sky, the application will present an image of an unpolluted China.

Goals

The goal of this project is to implement a mobile application on Android platform that removes haze from an image with unclear/polluted scene. This image can range from heavily polluted cities to foggy mornings. The expected output will be a clearer image with higher contrast ratio as well as consistent and relatively realistic appearance.

Approach

Most regions of an image that are not part of the sky contain a few pixels that have a low intensity in one of the RGB channels. Using this concept we can estimate the thickness of haze from the intensity of the dark channels^[2]. We need a more efficient algorithm for implementation on a mobile phone, so we will detect dark pixels whose intensity is close to zero, use their values to calculate the transmission at that point, and use the transmission to estimate the values of nearby pixels. We then segment the image and use a 2D linear fitting of a transmission equation^[3]. Based on the quality of our resulting image, we may also implement denoising^[4].

References

[1] <http://www.economist.com/news/briefing/21583245-china-worlds-worst-polluter-largest-investor-green-energy-its-rise-will-have>

[2] http://research.microsoft.com/en-us/um/people/jiansun/papers/dehaze_cvpr2009.pdf

[3] <http://www-scf.usc.edu/~qiyu/Papers/ivcnz2011.pdf>

[4] <https://users.soe.ucsc.edu/~milanfar/publications/conf/SPIEHaze2012.pdf>