IMAGE DEHAZING

GROUP MEMBERS

DEVAN MANOJ	AM.EN.U4AIE20020
GOKUL D RAJ	AM.EN.U4AIE20029
KARAN R JAYAN	AM.EN.U4AIE20040
PRINCE ABRAHAM GEORGE	AM.EN.U4AIE20057
R S PARVATI NAIR	AM.EN.U4AIE20058

PROBLEM

1. We are given a hazed image as input and haze must be removed.
2. Haze is one of the most censorious problems in the areas of image processing, hindering computer vision. Because, it changes the colours and diminishes the contrast of images, it reduces the visibility of the scene.
3. However, removing haze is a difficult problem because the haze is dependent on the unknown depth.
4. The problem also is under-constrained if the input is only a single hazy image.

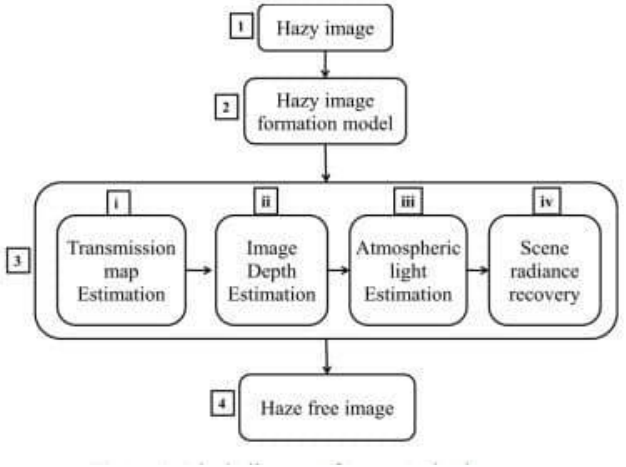
METHODS

Dark Channel Prior (DCP) - The DCP is based on the property of “dark pixels”, having a very low intensity in at least one colour channel, except for the sky region.

After calculating Dark Channel Prior.

It mainly consists of four steps :

1. Atmospheric light estimation
2. Transmission map estimation
3. Transmission map refinement
4. Image reconstruction



OBSERVATION

1. The DCP algorithm might work inefficiently for certain indoor images because of the lack of atmospheric light in the background and it is an important aspect while calculating dark channel prior.
2. In images with mostly sky region as its background, distorted patches have been observed in the background.
3. Patch size must neither be too small nor be too large. If it is too small, the image will become heavily saturated.And at the same time if it is a bit high, the presence of halos becomes obvious.

RESULT

The images after dehazing were evaluated using evaluation metrics - PSNR and SSIM. The evaluation values of 10 images are given in the table displayed by the side.The result obtained after Dark Channel Prior Implementation is also shown. (Average SSIM - 0.858, PSNR - 17.22)

SL. NO	SSIM	PSNR
1.	0.859	14.02
2.	0.845	20.34
3.	0.868	21.74
4.	0.855	16.62
5.	0.827	18.49
6.	0.883	20.01
7.	0.854	16.54
8.	0.861	14.07
9.	0.853	13.05
10.	0.874	17.29

REFERENCES

1. Codruta O. Ancuti, Cosmin Ancuti, Radu Timofte, & Christophe De Vleeschouwer (2018). O-HAZE: a dehazing benchmark with real hazy and haze-free outdoor images. In *IEEE Conference on Computer Vision and Pattern Recognition, NTIRE Workshop*

2. Geet Sahu, Ayan Seal, Ondrej Krejcar, Anis Yazidi, "Single image dehazing using a new color channel", Journal of Visual Communication and Image Representation, Volume 74, 2021, 103008, ISSN 1047-3203, https://doi.org/10.1016/j.jvcir.2020.103008.

3. F. Liu and C. Yang, "A fast method for single image dehazing using dark channel prior," 2014 IEEE International Conference on Signal Processing, Communications and Computing (ICSPCC), 2014, pp. 483-486, doi: 10.1109/ICSPCC.2014.6986240

4. KITTI Benchmark (Image Dehazing) | Papers With Code

5. https://www.kaggle.com/balraj98/synthetic-objective-testing-set-sots-reside