Stage 1: Project Proposal

Image Contrast Enhancement using Exposure Fusion Framework

Rohit Chaku 201601067
Tikam Alma 201601030

Professor Manish Khare
Digital Image Processing, IT472

Dhirubhai Ambani Institute of Information and Communication Technology

Submission Date: February 7, 2019

1 Team Details:

The group of students who have proposed this project are Tikam Alma, **201601030** and Rohit Chaku, **201601067**, from B.Tech. 3rd Year.

2 Project Overview:

The research paper on *A New Image Contrast Enhancement Algorithm using Exposure Fusion Framework[2]* written and presented in the 17th International Conference on Computer Analysis of Images and Patterns by Zhenqiang Ying, Ge Li1, Yurui Ren, Ronggang Wang, and Wenmin Wang, from Peking University, Shenzhen, China is being used as substantial basis for this project proposal.

The paper focuses on low-light images, which hinder the human and computer vision alike. To tackle this multiple image enhancement techniques have been proposed and developed, however, they all introduce contrast under/over enhancement. The paper consists of new image contrast enhancement algorithm to provide an accurate contrast enhancement. The paper taken up as the subject of further analysis also uses the pre-existing camera response model developed by the same authors[1]. The whole process follows three steps:

1. Designing a weighted matrix from image fusion using illumination estimation techniques.
2. Synthesising multi-exposure images using the already established camera model[1].
3. Finding the best exposed ratio, so that the synthetic image is well-exposed in the regions where the original image under-exposed.
4. Fusing the input image and the synthetically generated image according to the already generated weighted matrix to obtain the enhanced result.

This is the procedure that we will be following and implementing throughout the project duration. The aim is the verification of this new enhancement algorithm and, if possible, comparison with other already established procedures[3, 4] to do the same.

3 Timeline:

The following is the estimated timeline throughout the course of project implementation; it may be subject to change according to the complications that may arise during the same. The

different segments have an allocation of 15 days each:

1. Analysis of Problem and Paper: This segment involves the understanding of the paper and it's prerequisites. This also involves the necessary understanding of pre-existing models.

2. Algorithmic Approach: This segment involves the mathematical computation and derivation of the current enhancement algorithm, and its further comprehension.

3. Implementation Stage: This is the segment where the algorithm will finally be implemented. The current language is chosen to be python for ease of use and availability of libraries (this might be subject to change according to requirements of the project in the future).

4. Comparison and Evaluation: During this segment, provided implementation stage has been successful, the algorithm will be compared to others and it's critical analysis.

And with this, our project will conclude.

References

[1] Ying, Z., Li, G., Ren, Y., Wang, R., Wang, W.: A new low-light image enhancement algorithm using camera response model (2017), manuscript submitted for publication
Conference: International Conference on Computer Vision Workshop (ICCV Workshop)

[2] Ying, Z., Li, G., Ren, Y., Wang, R., Wang, W.: A New Image Contrast Enhancement Algorithm using Exposure Fusion Framework (2017)
Conference: International Conference on Computer Analysis of Images and Patterns (CAIP)

[3] Histogram Equalization
`https://en.wikipedia.org/wiki/Histogram_equalization`

[4] Adaptive Histogram Equalization
`https://en.wikipedia.org/wiki/Adaptive_histogram_equalization`