

Robust Exposure Correction

Team Triton

Group 04

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Problem Statement

- People often come across images or videos which are not clicked or recorded nicely.
- This could happen due to variations in lighting while clicking images.
- We have solved this problem by automatically correcting the different exposures present inside the image in different phases.
- Our project proposal is to implement the proposed technique of the paper over short low light videos.

Problem Statement



Motivation

- Images and videos are not always taken perfectly.
- Due to inappropriate lighting conditions, we may miss out some important moments.
- There are automatic exposure correction techniques available, but they require manual intervention and may not give appropriate results as well.
- We worked over this problem of automatically correcting the exposures present inside the image or videos and to provide good and smooth results .

Original Paper

- We implemented the following paper [Dual Illumination Estimation for Robust Exposure Correction.](#)
- The paper proposes a novel automatic exposure correction method, which robustly produces high-quality results for images of various exposure conditions (e.g., underexposed, overexposed, and partially under- and over-exposed).
- For this purpose, dual illumination estimation is used. Here "dual" indicates that, two intermediate exposure correction results are obtained for the input image.
- One fixes the underexposed regions and the other one restores the overexposed regions of the input image.

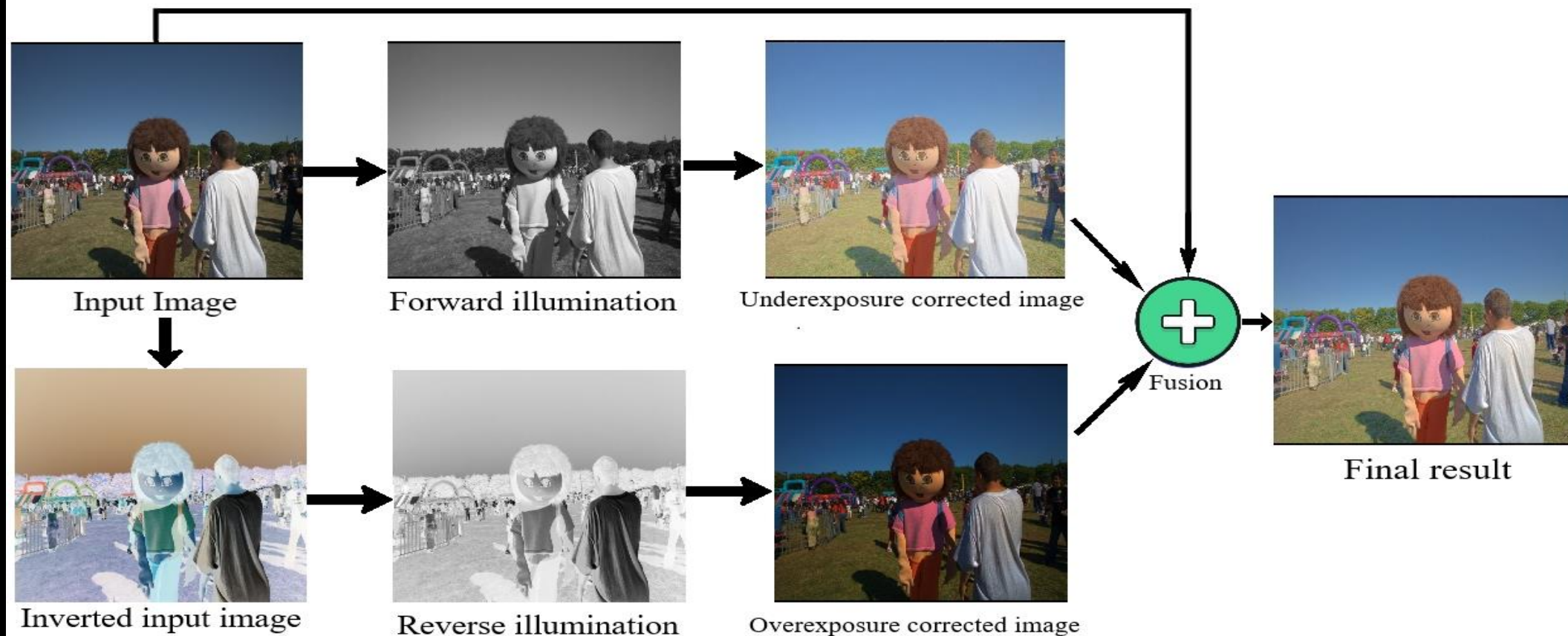
Extensions to Original Paper

- Our proposal is to implement the proposed technique of the paper over short length videos containing inappropriate exposures.
- We first try to implement the code over images, to correct under and over exposed images. Our code take images of various format like png, jpg, bmp,dng etc.
- Other image formats can be added to the code.
- We have taken reference from the implementation of the paper from here <https://github.com/pvnieto/Low-light-Image-Enhancement>.

Extensions to Original Paper

- We performed a bunch experiments over the code like checking output for appropriate parameters.
- Manipulating the filters to be used for edge detection like we used sobel,canny etc.
- At last, we extended the implementation of the original paper to videos while incorporating the experiments over the parameters.

Flow diagram



Techniques we used

- Mainly we have worked on exposure correction of short videos, but the paper is implemented on images. In addition, we have used different edge detection techniques namely Sobel and canny.
- Sobel takes less time as compared to canny, but the number of edges detected by Canny is much more than edges detected by Sobel.
- For an input image, the dual illumination estimation is first performed to obtain the forward and reverse illuminations, from which we then recover the intermediate under- and over-exposure corrected images of the input. Next, an effective multi-exposure image fusion is applied to seamlessly blend visually best-exposed parts in the two intermediate exposure correction images as well as the input image into the final globally well-exposed image.

Results



Input image



Output image

Results



Input image



Output image

Evaluation metrics

- From evaluation points of view, we stated in the project proposal that we will take ratings from people around us.
- But due to such unfavourable circumstances due to pandemic, we could not urge people around us for their ratings.
- But, on taking ratings from each other the mean comes out to be 4/5.
- The main reason behind missing 1 point over here is that when the video has very low light along with noise, the algorithm's output quality somewhat degrades.

Work Distribution

- Nitish Gangwar (203050069):
 - Exposure correction code, reflection essay, presentation.
- Vishal Sanoria (203050112):
 - Image fusion code, dataset selection.
- Abhijeet Pratap Singh (203059001):
 - Video processing code, presentation.

Deliverables

- We stated that in the first checkpoint submission we will finish the exposure correction code over images but till that time the code was not complete (which can be seen from old commits on github).
- For the final submission of project, we hailed to implement the paper over short length videos.
- Which we have accomplished the way we stated and apart from this we also performed several manipulations over different parameters in search of other alternatives for better solutions.



Thank You