CSE4019 – Image Processing

Project Report

GENERATING A HDR IMAGE FROM AN EXPOSURE SEQUENCE

By

19BPS1025 SUCINTHAR S

19BPS1076 JARUN MADHESH

19BPS1110 ARAVIND J

B. Tech Computer Science and Engineering

Submitted to

GEETHA S

School of Computer Science and Engineering

VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

April 2022

ACKNOWLEDGEMENT

We are highly grateful to Dr. **GEETHA S**, Professor, School of Computer Science and Engineering (SCOPE), Vellore Institute of Technology, Chennai for providing this great opportunity to do this review and has been of great help in sharing knowledge and helping us throughout this whole project term and is acknowledged with gratitude.

We would like to express my gratitude to other faculty members of SCOPE CSE department for their intellectual support throughout this work.

19BPS1025 SUCINTHAR S
19BPS1076 JARUN MADHESH
19BPS1110 ARAVIND J

CONTENTS

ABSTRACT

Generating HDR image from a sequence of multi-exposure shots and evaluate them with different methods. HDR stands for high dynamic range. Dynamic range is simply the range of the lightest tones to the darkest tones within a photo. Put another way — it's a measure of the light intensities from the highlights to the shadows.

The higher dynamic range your camera has, the closer the photo will compare to what an eye can see. This means that you'll be able to capture more details in the shadows that might otherwise appear pure black, and you'll be able to see details in the highlights that might otherwise be washed out with white.

2 Requirements Specification

2.1 Software Requirements

Jupyter Notebook

Opencv

Implementation Code

Dataset link:

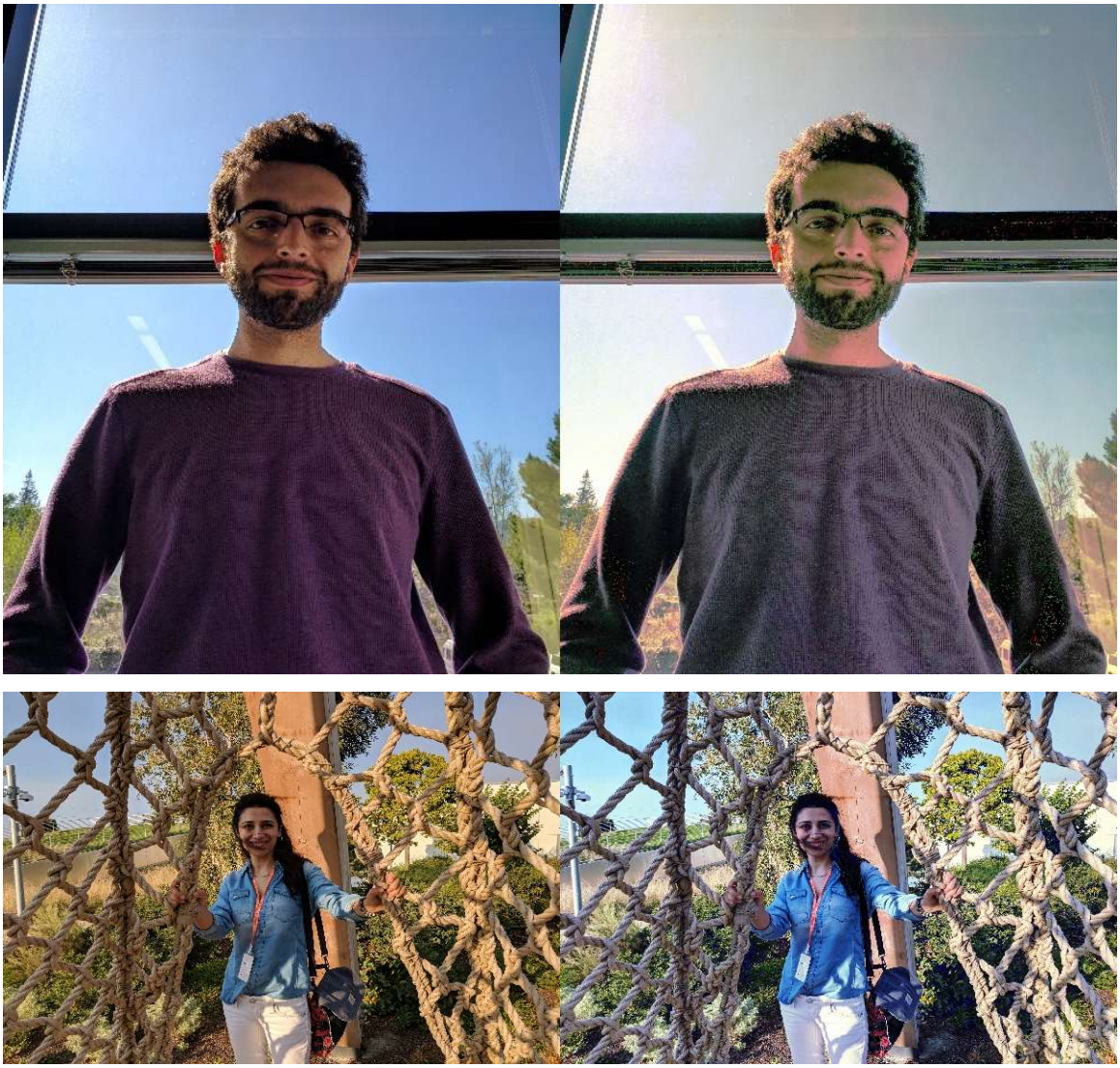
Burst photography for high dynamic range and low-light imaging on mobile cameras

Samuel W. Hasinoff, Dillon Sharlet, Ryan Geiss, Andrew Adams, Jonathan T. Barron, Florian Kainz, Jiawen Chen, and Marc Levoy ACM Transactions on Graphics (Proc. SIGGRAPH Asia 2016), 35(6), 12 pp.

GitHub link

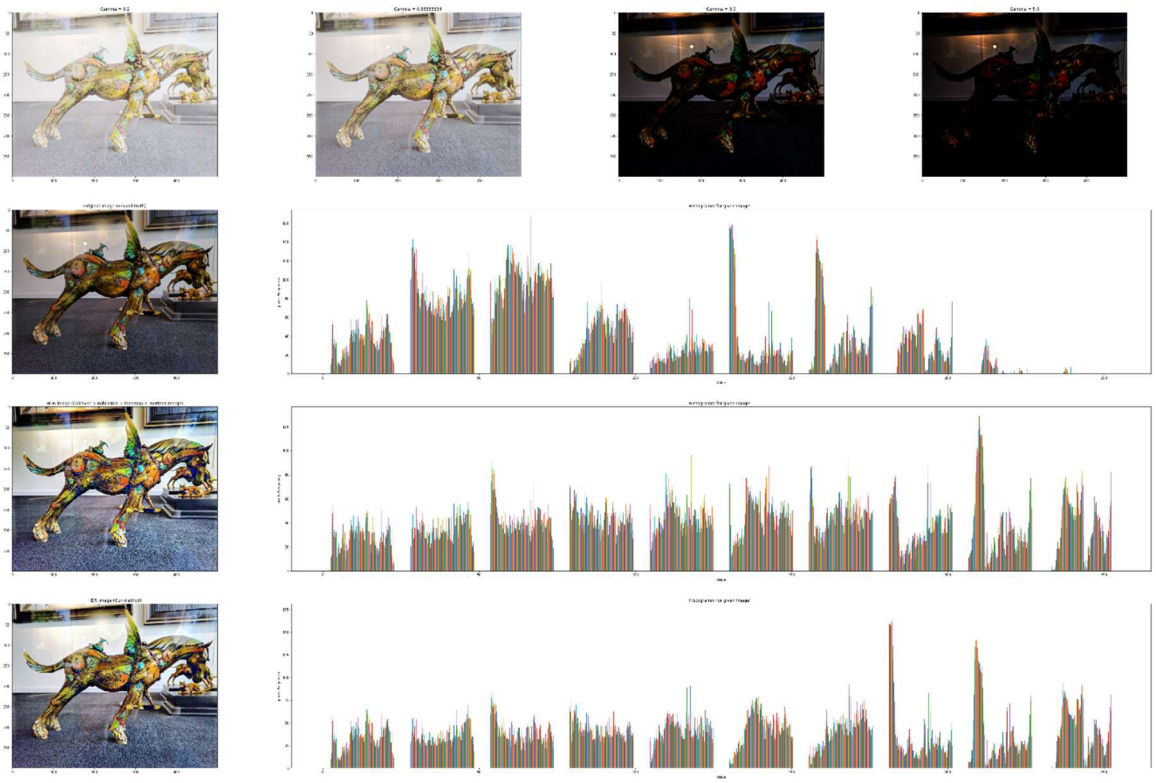
Results and Discussion

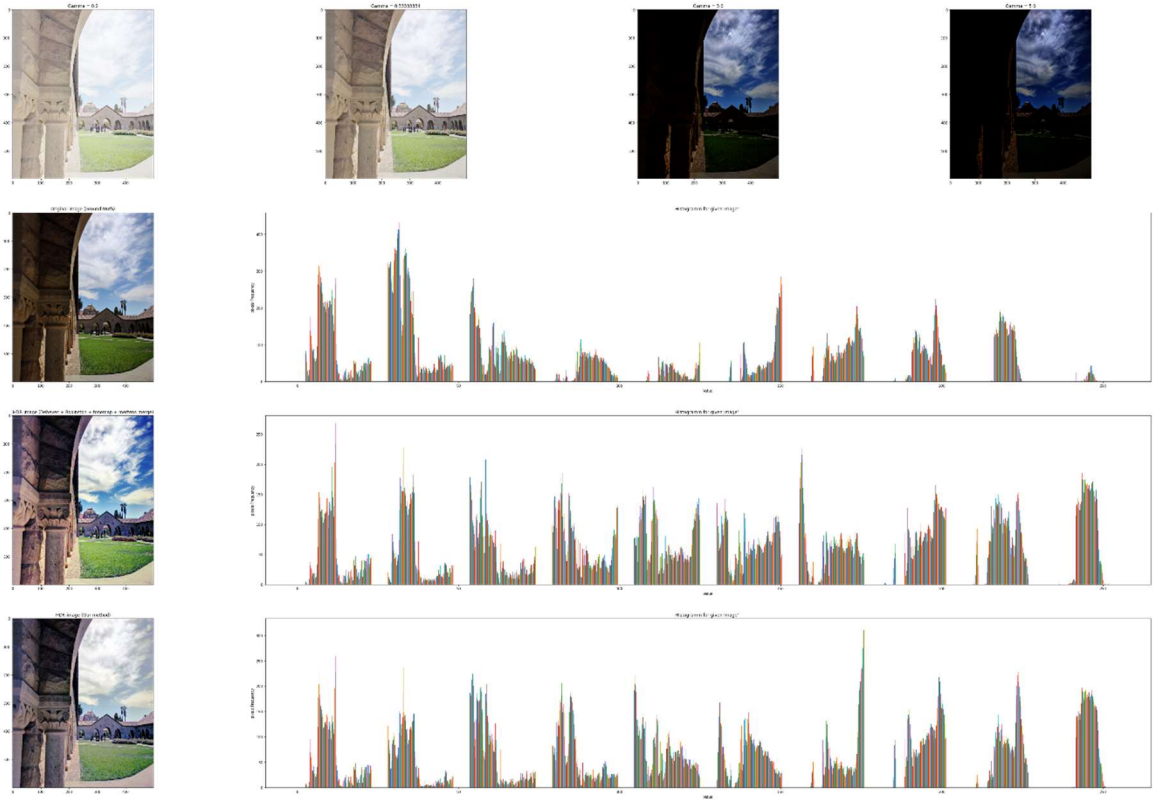
HDR image from proposed method

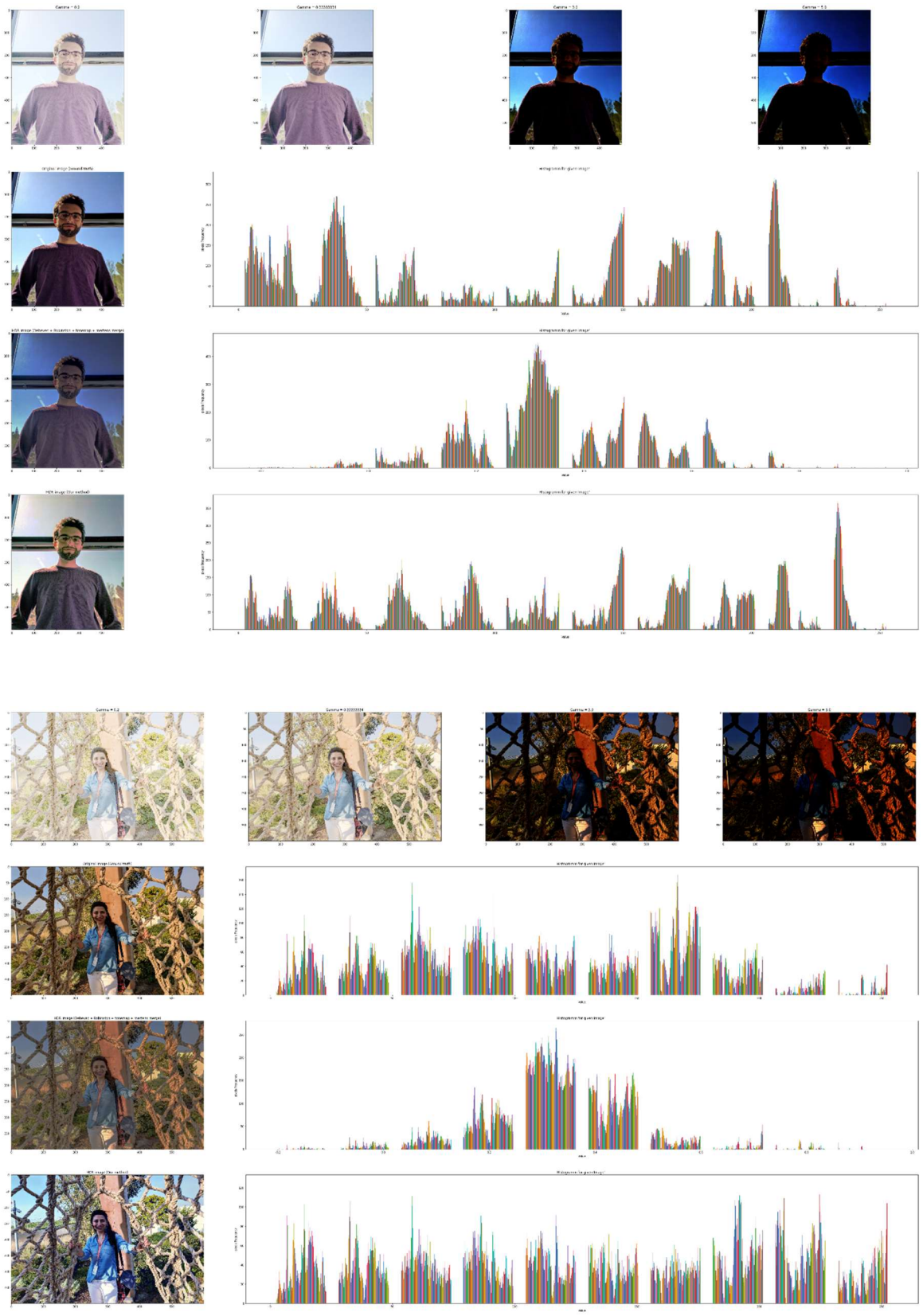


EVALUATION

We have analyzed the different methods and compared it with our method for generating best HDR image.







Conclusion

We have generated a HDR image from a sequence of multi-exposure shots and evaluate them with different methods. We have analyzed the different methods and compared it with our method for generating best HDR image. The methods used to compare our proposed method are Debevec method, Robertson method, Mertens fusion and Reinhard Tonemap. And we have observed that the proposed method shows a better HDR image of the groundtruth image on comparison with above mentioned method. Another advantage was that other method shows a HDR image only on 32bit per pixel but the proposed method can shows the output at 8bit per pixel itself this helps in 400% more compression.

REFERENCES

https://arxiv.org/abs/2106.01439

https://learnopencv.com/high-dynamic-range-hdr-imaging-using-opencv-cpp-python/

Debevec method: http://www.pauldebevec.com/Research/HDR/debevec-siggraph97.pdf

Robertson method: https://resources.mpi-inf.mpg.de/tmo/EG05_HDRTutorial_Complete.pdf

Mertens fusion: https://www.researchgate.net/publication/4295602_Exposure_Fusion

Reinhard Tonemap: https://www.cl.cam.ac.uk/~rkm38/pdfs/mantiuk08datm.pdf

https://resources.mpi-inf.mpg.de/tmo/EG05_HDRTutorial_Complete.pdf

https://ieeexplore.ieee.org/abstract/document/8350767