University of California Santa Cruz

CMPE264 Proyect 1: High Dynamic Range (HDR) System

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1 Introduction

2 Camera Radiometric Calibration

First we need to reverse-engineer the function $f(\cdot)$ and invert it, obtaining an approximation of the true (linear) brightness $B = f - 1(B')$.

Figure 1: Fuji X-E2 white calibration images and exposure times. All images taken at ISO 800.

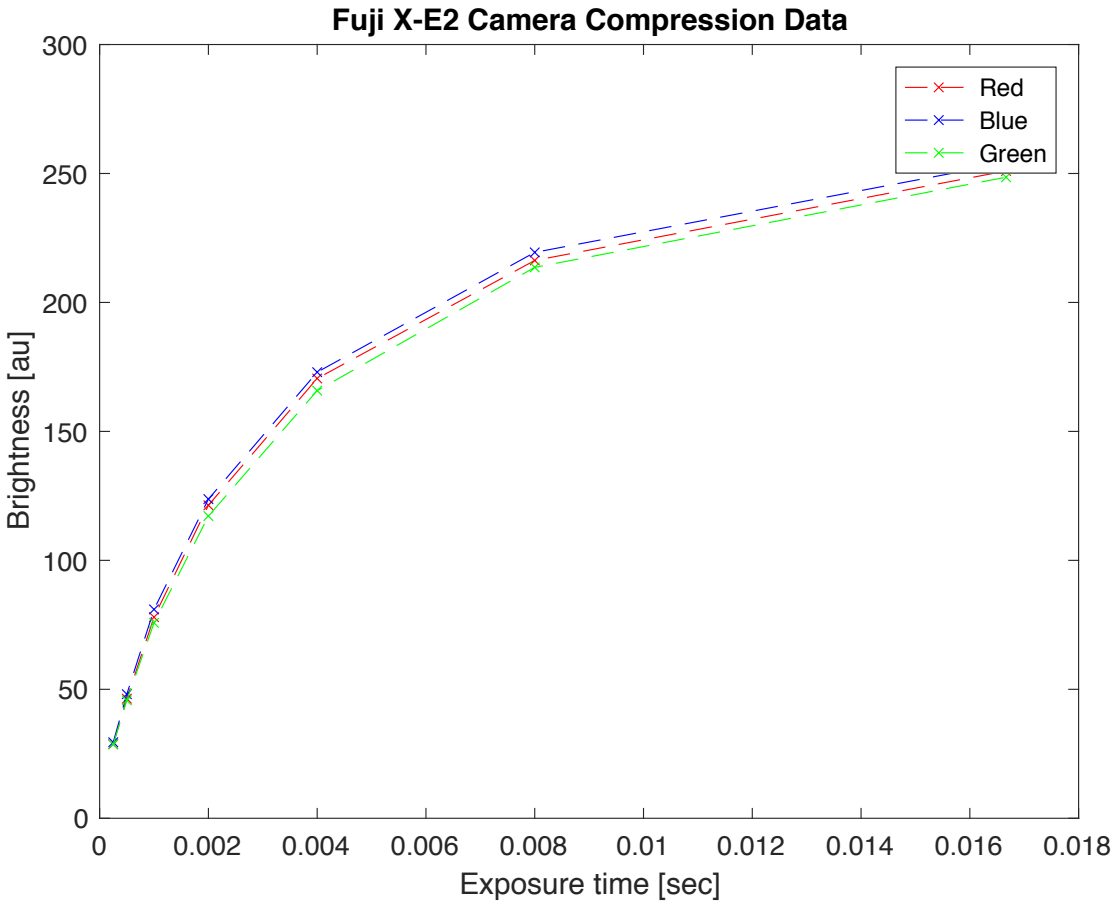

Figure 2: Fuji X-E2 brightness values versus exposure time at ISO 800.

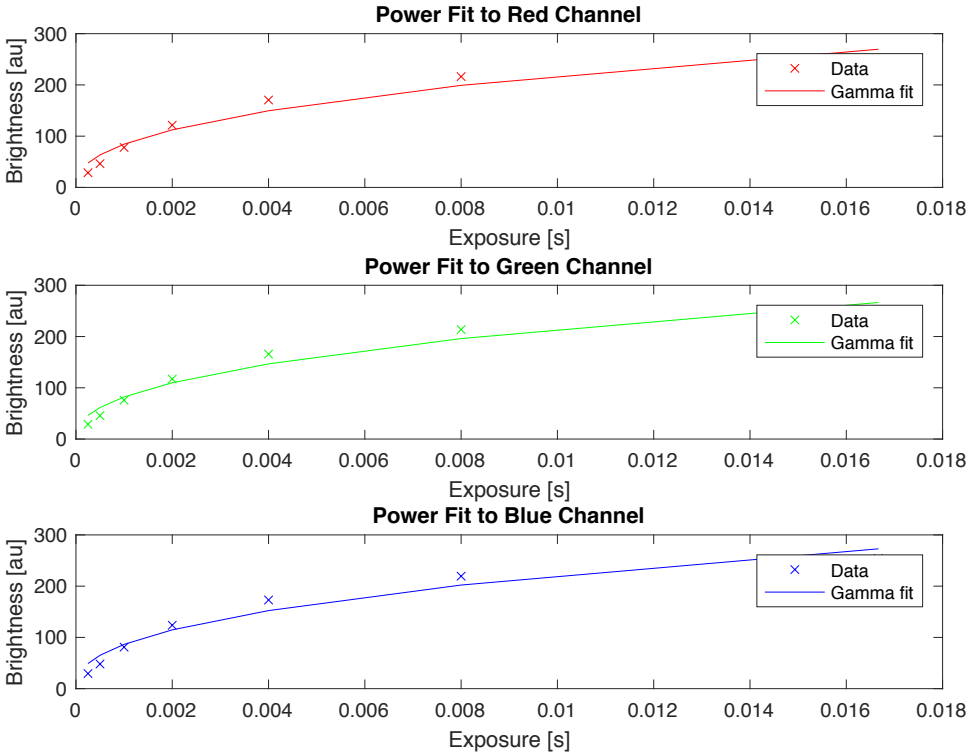

Figure 3: Power fit to the exposure data for each color channel

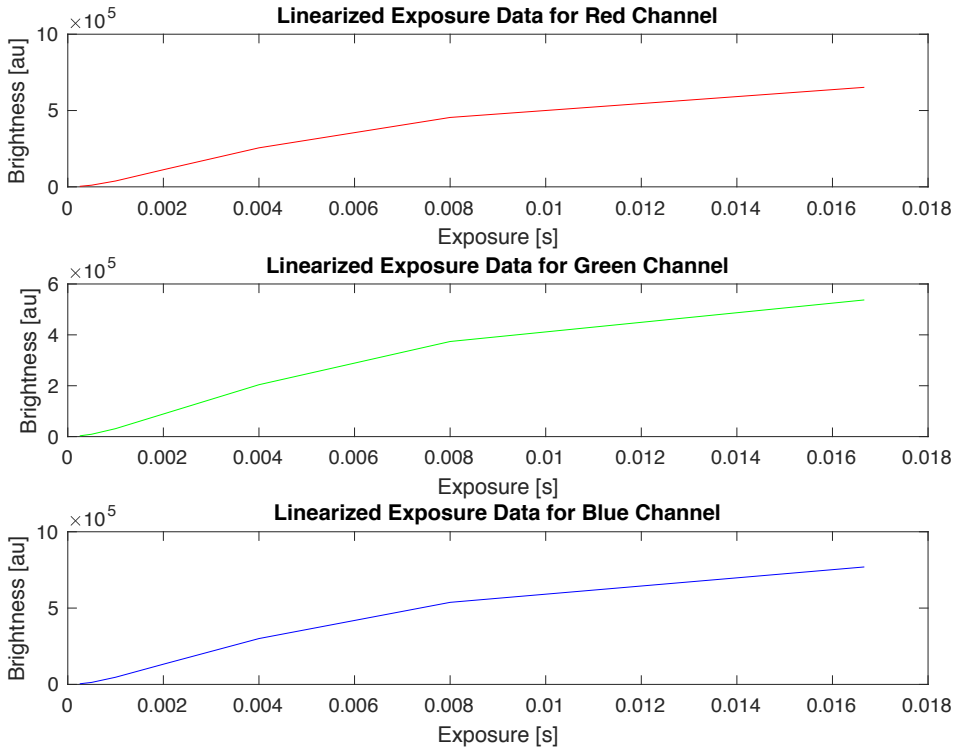

Figure 4: Linearization results on exposure data for each channel

3 Picture Stack Acquisition

Now weed to take a stack of 3 images of a high-dynamic (high contrast) scene, so we proceed to take a stack of multiple pictures at different exposure time T with fixed ISO gain G and based on their corresponding histograms we can decide which 3 pictures to extract from this stack.

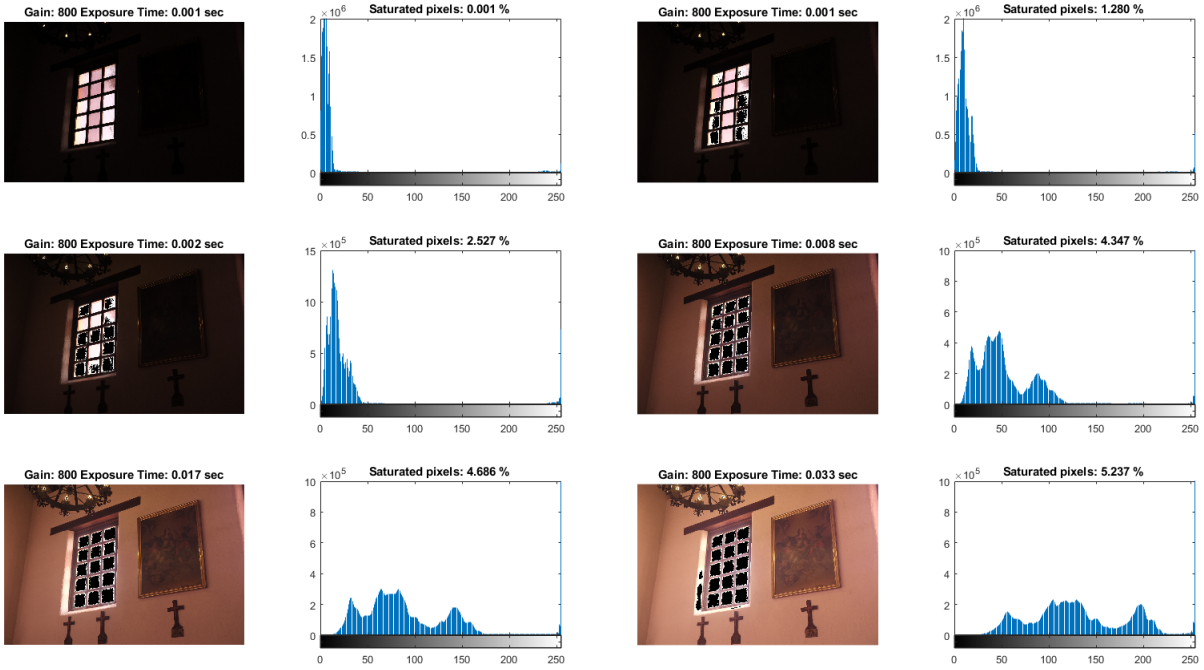

Figure 5: Picture Stack with ISO gain fixed at $G = 800$

4 Composite Image Creation

We proceed to create a composite HDR image from our stack of three linearized pictures. We will compose the images using two different algorithms.

4.1 Composition Algorithm 1

4.2 Composition Algorithm 2

5 Composite Image Reproduction

Now we need to revert the linearization by applying a non-linear function that will amplify the small values and reduce the large values

Figure 6: Composite image 1 after tone map function

6 Script Execution

6.1 Requirements

7 Conclusions