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HDR video past, present and future: A perspective

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Abstract

High Dynamic Range (HDR) video has emerged from research labs around the world and entered the realm of consumer electronics. The dynamic range that a human can see in a scene with minimal eye adaption (approximately 1,000,000 : 1) is vastly greater than traditional imaging technology which can only capture about 8 f-stops (256 : 1). HDR technology, on the other hand, has the potential to capture the full range of light in a scene; even more than a human eye can see. This paper examines the field of HDR video from capture to display; past, present and future. In particular the paper looks beyond the current marketing hype around HDR, to show how HDR video in the future can and, indeed, should bring about a step change in imaging, analogous to the change from black and white to colour.

Keywords: High dynamic range imaging, HDR, HDR video

1. Introduction

There can be a very broad range of lighting in a scene, from parts in bright sunshine to areas of dark shadow. The ratio between the darkest and brightest parts of a scene is known as its dynamic range. Figure 1 shows a sunset with a dynamic range of 10.6 f-stops. The dark area has a lighting level of 2.8 cd/m^2 (also known as nits), whilst the setting sun behind the clouds has a light level of 4,400 cd/m^2, giving the scene a dynamic range of $4400/2.8 = 1571.4 \approx 2^10.6$ ie just over 10 f-stops.