Using High Dynamic Range Home Master Statistics to Predict Dynamic Range Requirement for Cinema

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Abstract— The High Dynamic Range (HDR) home video format launched several years ago and has been adopted by the industry such that HDR Home Masters are created for most new release titles and are released for home video distribution using Ultra HD Blu-ray and digital formats. Mastering titles in HDR Cinema is the next logical evolution toward higher quality content and is thus greatly anticipated. However, mastering for HDR Cinema is still experimental due to the wide variety of potential HDR Cinema display technologies and their unique dynamic range characteristics. Determining the required dynamic range for HDR Cinema Masters is thus of great interest. In this paper, we propose an estimation of two properties of the dynamic range required for HDR Cinema Masters based on two different datasets. The first dataset corresponds to the dynamic range statistics and cumulative distribution function (CDF) of 41 Warner Bros. HDR Home Masters. Analyzing this dataset indicates that the maximum light level of a frame (the peak luminance values) is directly related to the Frame Average Light Level (FALL) of the frame. In other words, there is a maximum contrast between the intensity of the highlights in an image and the average intensity of the image. The second dataset is composed of matching mastered grades for SDR Cinema (DCI), Enhanced Dynamic Range Cinema (Dolby Cinema theatrical release) and HDR Home formats. Paired matching of content is useful to derive a translation between grades. By performing a cross-analysis between SDR and EDR Cinema content, we estimate a trend on the evolution of the FALL statistic when a higher dynamic range is provided. A second cross-analysis between HDR Home and EDR Cinema characterize the translation of mid-tones between small screens with surround illumination to big screens in a dark viewing environment. Using the different analyses, we predict two optimized properties of the dynamic range needed to represent most future HDR Cinema mastered conten- .

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