# HDR Notes

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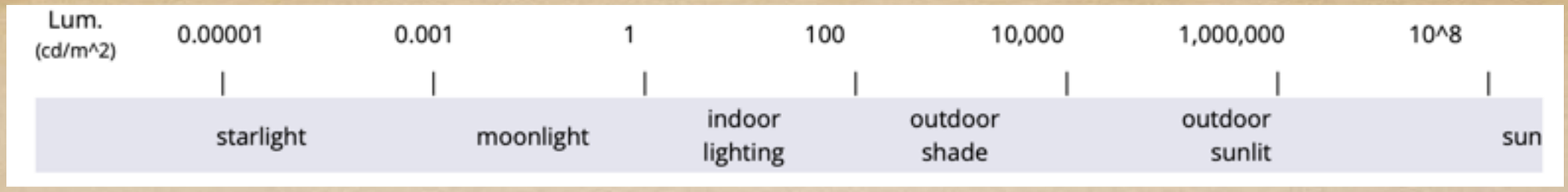
April,2020




- Dynamic Range - Ratio of max and min value of physical measurement. (For camera: Dynamic range is the ratio of saturation to noise. More specifically, the ratio of the intensity that just saturates the camera to the intensity that just lifts the camera response one standard deviation above camera noise.)

- HDRI - 32bit/channel; linear info

- Bits: 8-bit, 16-bit -> LDR (16 bit more precision but not HDR). 32-bit->Floating point, hence Unlimited values, HDR

- No. Of bits does Not necessarily gives the dynamic range of the scene.

- A tone mapped image is often confused with an HDR image. A tone mapped image is not an HDR image as it does not represent the original values of light captured anymore. It just "reproduces" the dynamic range captured on standard monitors or prints.

- digital cameras are only capture a limited dynamic range
- (the exposure setting determines which part of the total dynamic range will be captured).
- This is why HDR images are commonly created from photos of the same scene taken under different exposure levels.
- The linearity of HDR images makes them unfit for direct display on standard monitors. This is why applications supporting HDR images usually apply a gamma for viewing them.

- 2 ways to increase the dynamic range of digital photographs or scanned films I.e. producing a standard 24-bit image that represents the original high dynamic range scene as the human eye has seen it.

    - Exposure blending - This process merges differently exposed photographs of the scene into an image with details in both highlights and shadows.

    - Tone Mapping - This process compresses the tonal range of an HDR image of the scene in order to reveal its details in highlights and shadows. The input HDR image is either:

        - generated from differently exposed photos

        - produced by an HDR camera such as the SpheroCam HDR.

- Why Tone Map?
  - The reason is simple: standard display devices can only reproduce a low range (around 100 or 200:1), and for paper, the range is even lower.
  - 2 Types of Tone Mapping:
    - Global: Apply the same mapping for all the pixels regardless of the spatial information
    - Local: Take pixel location into account and determine the appropriate scaling. (dark vs light areas). Looks better but takes more compute time.
- Tone mapping also done when dynamic range of images > the dynamic range of the reproducing devices (monitors, paper).

- Contrast vs D.R.
  - High contrast: More whites and more darks.
    The histogram values are on the 2 extremes.
    The mid-tones are very less.
  - Low contrast: More of mid-tones in the image.
  - Contrast Not related to the Dynamic Range.
    The D.R. of a given camera is fixed.

# Reference

- https://www.hdrsoft.com/resources/dri.html