DYNAMIC PHOTO HDRi

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Creating tone-mapped images using only two hand-held exposures.

Here we will compare tone mapped results of the same image combined from various two exposures.

The 0EV image starts with a rather good exposure (by current digital camera standards). At this time we are not particularly interested in any special "hdr" effects, but rather comparing the effect of the different exposures on a final image.

The common problem on the 0EV image is the result of a strong light: Lack of details in shadows (1) and partially overblown highlights (2). Most commercial cameras are noisy in a dark areas so brightening shadows by conventional method (either curves, Gamma or histogram stretching) will also intensify noise - and we won't get much more details anyway.

Typically we will use -2EV exposure (underexposing) to give us coverage of the highlights and +2EV (overexposing) to bring details in the shadows.

We will examine in details below how using only 2 exposures will affect the combined image. Using only 2 exposures has the benefit of faster shooting and less alignment errors (if we don't use tripod, on foliage in wind, people moving etc. .) but it will obviously not produce the full details enhancements of combining 3 exposures.

All images use the same setting for tone-mapping - Eye catching option with all default settings. Camera used: Canon G7.

Results

In this first image we used only the -2EV and 2 EV image and discarded the good exposure completely.

(1) - The -2EV under-exposure brought a lot of noise to the sky that was not smoothed by the other +2EV overexposure simply because there is very little data on the +2EV in sky - the sky on

that image it is almost white.

(2) - The color contrast is rather strongly equalized which appears as a loss of clarity in that part of image.

(3) - The road is exposed correctly now with a lots of new detail coming from the -2EV image.

Detail of the sky area.

Second image uses only -2EV and 0EV .

(1) - The sky is now smoother, while the -2EV does introduce some noise, it is also merged with the 0EV which has the sky correctly exposed with less noise. This may not be always true for cheaper cameras, often the sky is already over-exposed in 0EV which may require to use -2EV and -1EV instead of 0EV.

(2) - We get better contrast in these dark shadowy areas. While both -2EV and 0EV does actually lack details in shadows if observed separately, the combination of them together seems to get enough data to pull new details.

Detail of the sky area.

The third image uses 0EV and +2EV .

(1) - The sky is even smoother, mostly taken from the sky-correctly exposed 0EV with very input from the over-exposed sky in +2EV

(2) - We get now a lot of details in the shadows, almost as if we used a fill-in light but a mid-shadows are getting little bit overexposed.

(3) - The road is taken primary from the 0EV (where it is already little bit overexposed)

Depending on the taste, this or the previous image did create the best looking picture.

Detail of the sky area.

Three exposures: -2, 0, +2 EV

As expected the 3 exposures produced the best, evenly exposed image. However we may already see a loss of sharpness due to the more difficult alignment (the three images were taken without tripod).

Also as observed in the first example, on correctly exposed parts in the middle range, the color contrast are partially equalized by the reversing effect of -2EV and +2EV. This somehow reduces the depth of the image.

Detail of the sky area.

Conclusion

Using two exposures instead of usual three is an attractive option for hand-held photography and often a reasonably good compromise for small, consumer digital cameras. In some cases when the 0EV image itself is already correctly exposed using three images may equalize the color contrast around the middle of the tone range, creating then rather weak image with a certain loss of depth.

However we discovered that when using two images, one of them should be 0EV or what the

camera - or you - thinks as a good exposure. The second image would be either over or under-exposed depending on the scene itself. For example if we take a picture with prominent sky as a backlight that would darken most of the subjects in front of it, we would then use +2EV to bring more data to the shadows.

If your camera has auto bracketing, you can always take three images but then in Dynamic Photo HDR, to save the time you can combine only the first (0EV) exposure with either minus or plus exposure depending on where is lack of details. This would be not only faster to compute but in hand-held or windy situation it will also exhibit less alignment problems.

- **Images created using a good camera (such as SLR) with very little ISO noise benefits from multiple exposures (three is almost always enough)**
- **Images created using a consumer type of camera *could* benefit more from using only two exposures where one of them is 0EV**
- **Your Mileage May Vary**