

Re: Is camera response needed for HDR based upon multiple exposures ?

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- *From:* [aruzinsky@xxxxxxxxxxxxxxxxxxxxxxxx](mailto:aruzinsky@xxxxxxxxxxxxxxxxxxxxxxxx)
  - *Date:* Fri, 12 Oct 2007 13:11:00 -0700
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On Oct 11, 6:28 am, haim <haimg...@xxxxxxxx> wrote:

Hello,

In many papers it is suggested to recover first the non linear response  $f(E)$  of the camera prior to the blending of images with different exposures. Given  $f$ , the inverse of  $f$  is estimated and the mixing of the images is carried out in that domain. On the other hand, many procedures to improve the dynamic range are based on simple rules working on the original images without any estimation of  $f$ . Could somebody clarify that point ??

Haim

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Haim

No, can you provide links to those papers?

Linearity is practically only important for postprocessing. Some tone mapping methods are visually insensitive to non linearity therefore linearity can be neglected in those cases. Optimizing signal to noise ratio is the important part and that is what some authors apparently neglect.

I have recent experience (reinvented wheel) with that and my methods will be incorporated into the next release of SAR Image Processor.

Stacking frames with different time exposures, by simple averaging,

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maximizes signal to noise ratio under the assumption of an additive white noise model with constant variance, and it is not necessary to know the variance or  $f(E)$ . Also, note that the signal varies between pixels and this is also unimportant. As far as I know, the only significant flaw of this model is that it does not take quantization and multiplicative noise into account. However, I can tell you that including quantization noise in the model would require knowing variance of the additive white noise to optimize. A simply stacked result will typically have a very non linear response (much worse than  $f(E)$ ) that looks very bad without further processing. My procedure involves adjusting the histogram of the simply stacked result to match that of a more linear, but, noisier image. You should be able to invent your own ways of doing this.

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