Suplemental Material for Temporally Coherent Local Tone Mapping of HDR Video

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In this document we provide additional details that were omitted in the main publication due to space limitations.

1 The impact of the number of iterations

We show different filtering and tone mapping results created with the help of our filter using different number of iterations, while the other parameters are fixed.

(a) *Base layer: 2 iterations* **(b)** *Tone mapping with (a)*

(c) *Base layer: 10 iterations* **(d)** *Tone mapping with (c)*

(e) *Base layer: 20 iterations* **(f)** *Tone mapping with (e)*

(g) *Base layer: 50 iterations* **(h)** *Tone mapping with (g)*

Figure 1: *Impact of the number of iterations on the base layer and the tone mapping result. All results are created with our method with parameters $\alpha = 2$, $\sigma = 0.2$, and $\lambda = 1$. The number of iterations varies.*

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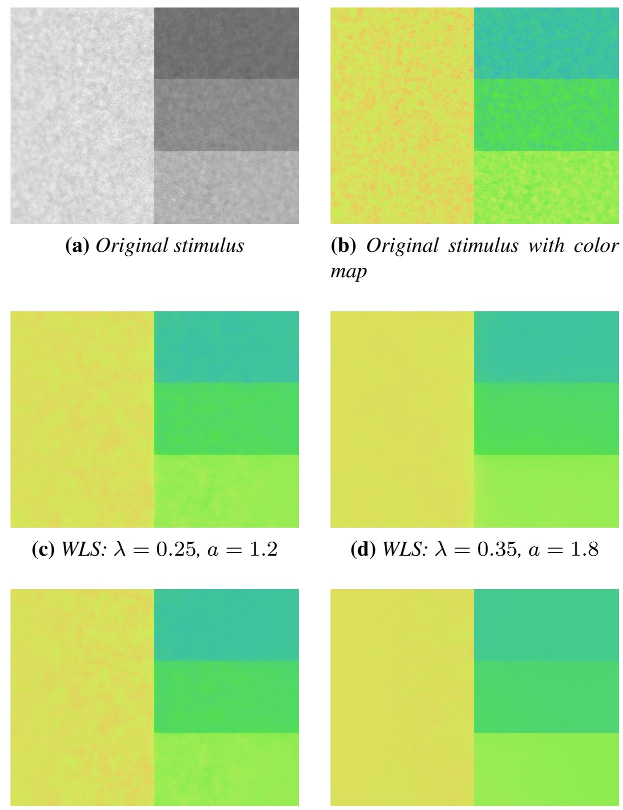
2 Comparison of filtering results with WLS

We compare filtering results obtained with our filter to filtering results of the WLS filter. These results are shown in Figure 2. Both methods generate qualitatively similar results, i.e. images (c) and (e), and images (d) and (f) are qualitatively similar.



(a) *Original stimulus* **(b)** *Original stimulus with color map*

(c) *WLS: $\lambda = 0.25$, $a = 1.2$* **(d)** *WLS: $\lambda = 0.35$, $a = 1.8$*

(e) *Our method: $\sigma = 0.05$, $\alpha = 1.3$, 1 iteration* **(f)** *Our method: $\sigma = 0.05$, $\alpha = 4.0$, 20 iterations*

Figure 2: *Comparison of filtering results of our method with WLS. Image (a) shows the original synthetic stimulus, while image (b) shows the same stimulus with help of a perceptually uniform color map. Filtering results generated with WLS are shown in (c) and (d). These results are generated with settings for WLS as reported in [Farbman et al. 2008]. Images (e) and (f) represent filtering results of our method with different settings. Result (e) is generated with only 1 iteration, while for the smoother result (f) 20 iterations are applied. Note that both methods generate qualitatively similar results.*

3 Adaptive Logarithmic Tone Mapping Curve

We generated the results in this work either by multiplying the log luminance of the base layer with a compression coefficient, or by using the adaptive logarithmic tone curve [Drago et al. 2003]. We observed that the former approach results in stronger detail reproduction but may look unnatural to some viewers. The latter approach can be configured to produce more balanced results. That said, theoretically any compressive tone curve can be applied to the base layer to achieve various visual styles. For completeness, the formula for the adaptive logarithmic tone mapping curve [Drago et al. 2003] as applied to the base layer B is given below:

$$B' = \frac{L_{dmax} \cdot 0.01}{log_{10}\left(L_{wmax}+1\right)} \cdot \frac{log(B+1)}{log\left(2+\left(\left(\frac{B}{L_{wmax}}\right)^{\frac{log(bias)}{log(0.5)}}\right)\cdot 8\right)}, \quad (1)$$

where L_{dmax} is set to 100 as in the original paper. The parameter L_{wmax} controls the clamping of bright values and in our implementation was set roughly to the maximum luminance of the input video. The main parameter $bias$ controls the shape of the compressive tone curve and was used as a free parameter to enable achieving the various looks presented in the paper and supplemental video.

4 Illustration of Warping using Optical Flow

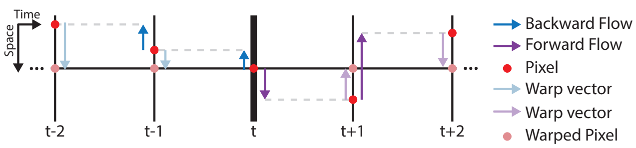


Figure 3: *1D Illustration of our temporal warping process described in Section 3 of the main publication.*

References

DRAGO, F., MYSZKOWSKI, K., ANNEN, T., AND CHIBA, N. 2003. Adaptive logarithmic mapping for displaying high contrast scenes. *Computer Graphics Forum 22*, 3, 419–426.

FARBMAN, Z., FATTAL, R., LISCHINSKI, D., AND SZELISKI, R. 2008. Edge-preserving decompositions for multi-scale tone and detail manipulation. *ACM Trans. Graph. 27*, 3, 67:1–67:10.