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Microsoft Research

Low Dynamic Range Solutions to the High Dynamic Range Imaging Problem

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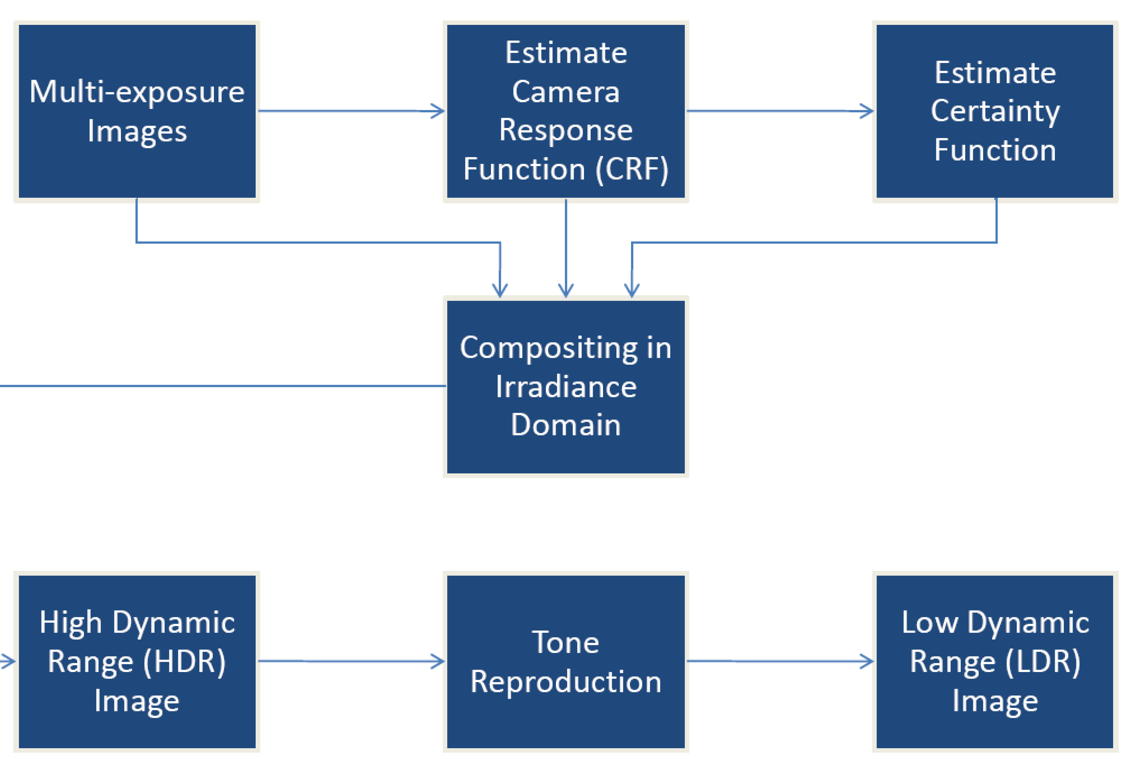
Static Scenes

Variational Compositing

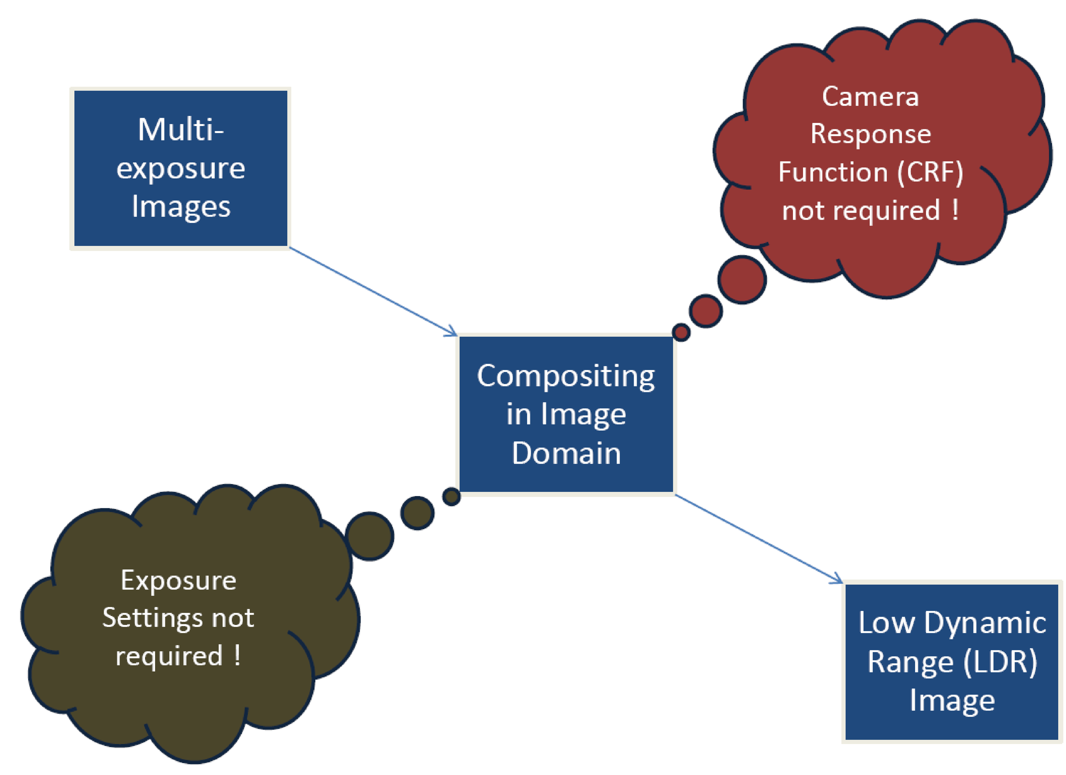
Exposure Fusion

Bilateral Compositing

Poisson Compositing



High Dynamic Range Imaging Methodology



Proposed Solutions

Relevant Publications

- ✓ Shanmuganathan Raman and Subhasis Chaudhuri, *"A Matte-less, Variational Approach to Automatic Scene Compositing", IEEE International Conference on Computer Vision (ICCV), Rio De Janeiro, Brazil, 2007*
- ✓ Shanmuganathan Raman and Subhasis Chaudhuri, *"Bilateral Filter based Compositing for Variable Exposure Photography", Short Paper, European Association for Computer Graphics Conference (EUROGRAPHICS), Munich, Germany, 2009*
- ✓ Shanmuganathan Raman and Subhasis Chaudhuri, *"Poisson Compositing", Sketch, ACM SIGGRAPH Asia, Yokohama, Japan, 2009*
- ✓ Shanmuganathan Raman, Vishal Kumar, and Subhasis Chaudhuri, *"Blind De-ghosting for Automatic Multi-exposure Compositing", Poster, ACM SIGGRAPH Asia, Yokohama, Japan, 2009*

$$\bar{g}(x,y) = \arg\min_g \left[\int\int_{x\,y}\left\{\left(g(x,y) - \sum_{m=1}^{K}\omega_m(x,y)\big(f_m(x,y)\big)\right)^2 + \lambda\left(g_x^2+g_y^2\right)\right\}dxdy\right]$$

where $\omega_m(x,y)$ is a function of local contrast and intensity values of the m[th] image.

Matte-less Variational Compositing

$$g(x,y)=\sum_{m=1}^{K}\alpha_m(x,y)f_m(x,y)$$

$$\alpha_m(x,y)=\frac{\left(C+\left|f_m(x,y)-f_m^{BF}(x,y)\right|\right)}{\sum_{n=1}^{K}\left(C+\left|f_n(x,y)-f_n^{BF}(x,y)\right|\right)}$$

Bilateral Compositing

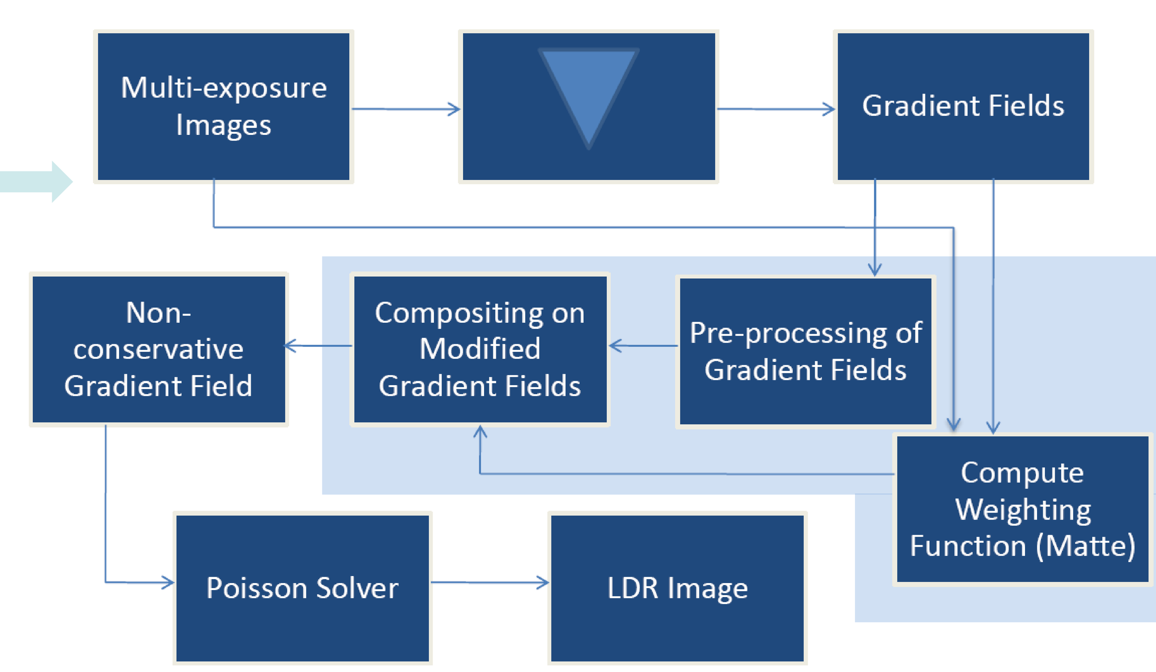
$$G^{LDR}(x,y)=\sum_{i=1}^{K}w_i(x,y)G_i'(x,y)$$

where

$G_i'(x,y)$ is the modified gradient field corresponding to the i[th] image,

$G^{LDR}(x,y)$ is the gradient field corresponding to the desired LDR Image.

Poisson Compositing



Dynamic Scenes

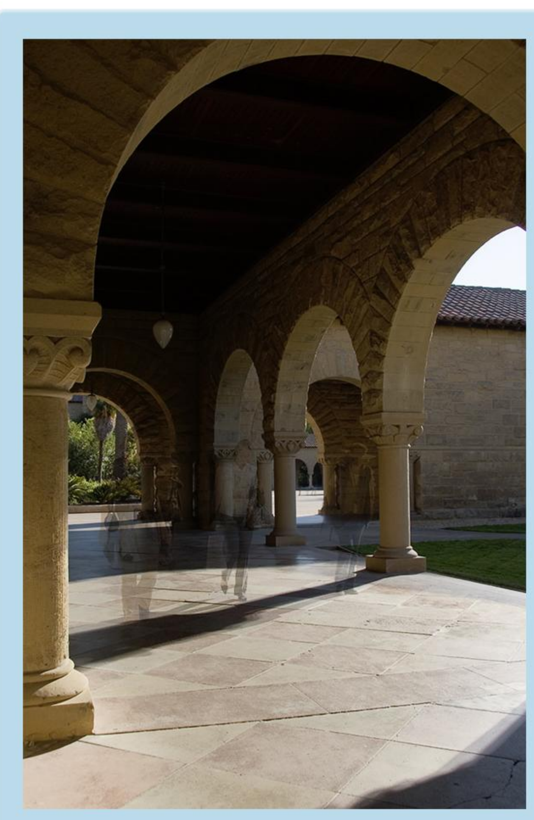
Multi-exposure Images of a Dynamic Scene

Motion Detection w r t. 5[th] Image

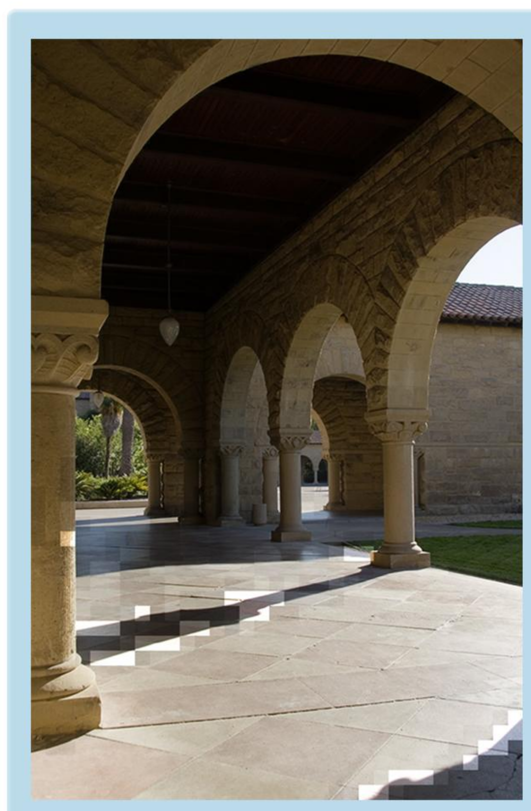
Data Courtesy

Erik Reinhard, University of Bristol

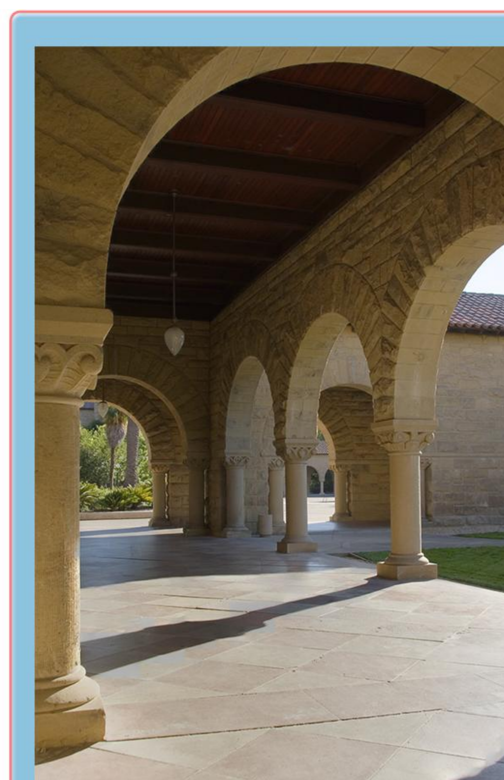
Orazio Gallo, UCSC



Presence of Ghosts (No Motion Detection)



Artifacts on Patch Boundaries



Final LDR Image (Proposed Approach)

Advantages

*Assumes **no** knowledge of Camera Response Function and Exposure Settings*

Generates artifact-free LDR image compatible with common Displays and Printers

Acknowledgements: Kumar Vishal, IIT Bombay

Further Details: http://www.ee.iitb.ac.in/student/~shanmuga/stuff.htm

Approach for Dynamic Scenes