

## **Fast Bilateral Filtering for the Display of High-Dynamic-Range (HDR) Images**

Technology #9891-10516

### **Applications**

This technology is a fast and improved method to display high-contrast, high-dynamic-range (HDR) images.

### **Problem Addressed**

In digital photography, the management of contrast via exposure, lighting and printing (among other methods) is crucial to the craft. Contrast reduction techniques are therefore in high demand for use in digital photography as well as numerous other applications including image-processing and medical imaging. The inventors present a new technique for the display of HDR images which reduces the contrast while preserving detail of the original image.

### **Technology**

The technology takes an HDR image as an input and performs a two-scale decomposition of the image into a base layer, which encodes large scale features, and a detail layer. Only the base layer has its contrast reduced, thereby preserving detail. The base layer is achieved by using a fast and robust edge-preserving filter called the bilateral filter. This non-linear filter is derived from a Gaussian blur filter, in which the weight of each pixel is computed in a manner that decreases the weight of pixels with large intensity difference. As a result, the filter blurs the small variations of a signal (e.g., noise or texture detail) but prevents blurring across edges. The Inventors improve upon existing bilateral filtering techniques by using a piecewise-linear approximation to linearize the filtering process and accelerate it by two orders of magnitude.

### **Advantages**

- Edge-preserving filter accelerates image decomposition by factor of 100
- Method requires no parameter setting
- Fast and robust contrast-reduction to display high-contrast HDR images with original image quality

### **Categories For This Invention:**

Computer Sciences & Information Technology  
Imaging (Computer Sciences & Information Technology)  
Signal Processing

### **Intellectual Property:**

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Method of performing fast bilateral filtering and using the same for the display of high-dynamic-range images

Issued US Patent

7,146,059

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## **Publications:**

Fast Bilateral Filtering for the Display of High-Dynamic-Range Images

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## **External Links:**

Computer Graphics Group

<http://graphics.csail.mit.edu/>

## **Image Gallery:**



*FIG. 1* PRIOR ART