www.elsevier.com/locate/cbm

Enhanced Dynamic Range X-ray Imaging

Mark A. Haidekker, Logan Dain-kelley Morrison, Ajay Sharma, Emily Burke

PII: S0010-4825(17)30020-3
DOI: http://dx.doi.org/10.1016/j.compbiomed.2017.01.014
Reference: CBM2586

To appear in: *Computers in Biology and Medicine*

Received date: 23 June 2016
Revised date: 18 January 2017
Accepted date: 23 January 2017

Cite this article as: Mark A. Haidekker, Logan Dain-kelley Morrison, Ajay Sharma and Emily Burke, Enhanced Dynamic Range X-ray Imaging, *Computer in Biology and Medicine,* http://dx.doi.org/10.1016/j.compbiomed.2017.01.014

Enhanced Dynamic Range X-ray Imaging

Mark A. Haidekker[a,*], Logan Dain-kelley Morrison[a], Ajay Sharma[b], Emily Burke[b]

[a] *University of Georgia*
College of Engineering
Driftmier Engineering Center
597 D.W. Brooks Drive
Athens, GA 30602-4435, USA
Phone: 706-542-1653
Fax: 706-542-8806
[b] *University of Georgia*
College of Veterinary Medicine

Abstract

X-ray images can suffer from excess contrast. Often, image exposure is chosen to visually optimize the region of interest, but at the expense of over- and underexposed regions elsewhere in the image. When image values are interpreted quantitatively as projected absorption, both over- and underexposure leads to the loss of quantitative information. We propose to combine multiple exposures into a composite that uses only pixels from those exposures in which they are neither under- nor overexposed The composite image is created in analogy to visible-light high dynamic range photography. We present the mathematical framework for the recovery of absorbance from such composite images and demonstrate the method with biological and non-biological samples. We also show with an aluminum step-wedge that accurate recovery

*Corresponding author
Email address: mhaidekk@uga.edu (Mark A. Haidekker)