



Sensors

Multi-Scale Retinex with Color Restoration

Enhancing digital images with ease

NASA Langley Research Center has developed a digital image enhancement method called Retinex. The Retinex method is an automatic, general purpose algorithm that greatly improves the visual realism, quantity, and quality of perceived information in the digital image. This innovative technology enables an entirely new level of visual realism and visual quality in digital imaging and does so with the ease, low cost, and speed of automatic operation. The technology has also been demonstrated in aerospace imaging applications such as Space Shuttle operations, Shuttle Earth observations, and KIDSAT.

BENEFITS

- In-place application and repair
- Greater visual realism in digital images
- Enhanced quantity and quality of perceived information in the digital image
- No need for manual image manipulation
- Increased speed due to automatic operation
- Affordability and ease of use

technology solution

THE TECHNOLOGY

Currently, the visual quality of images is poor for scenes with lighting variations such as shadows and when color shifts in illumination occur, as in photos taken at sunset. The Multi-Scale Retinex with Color Restoration corrects all these commonplace problems by synthesizing dynamic range compression, color constancy, sharpening, and color/tonal rendition. Color and detail can be lost or suppressed in shadows or other low-light-level zones in a scene. These same scenes, when viewed directly by the human observer, are quite vivid by comparison with the recorded image. The device corrects these deficiencies with automatic general-purpose computations.



Original image (left) and the same image enhanced with Retinex (right)

APPLICATIONS

The technology has several potential applications:

- Video and large-format imaging in commercial software packages and hardware processors
- Digital motion picture high-speed applications
- Improved document imaging
- Enhanced low-cost digital color cameras and color printers for use with personal computers
- Specialized medical imaging applications
- Forensic/surveillance imaging for greater clarity and accuracy

PUBLICATIONS

Patent No: 5,991,456

National Aeronautics and Space Administration

The Technology Gateway

Langley Research Center

Mail Stop 151
Hampton, VA 23681
757.864.1178
LARC-DL-technologygateway@mail.nasa.gov

<http://technology.nasa.gov/>

www.nasa.gov

NP-2015-07-1950-HQ

NASA's Technology Transfer Program pursues the widest possible applications of agency technology to benefit US citizens. Through partnerships and licensing agreements with industry, the program ensures that NASA's investments in pioneering research find secondary uses that benefit the economy, create jobs, and improve quality of life.

LAR-15514-1-SB

