

Course ID
DIGIMAGE1
Course Duration
1-3 days

Course Title
Digital Image Processing Training

Aimed At

Managers (technical and non-technical) and technical professionals whose job requires an understanding of image processing.

Prerequisites

A general knowledge of digital cameras and photography. Some of the material is technical, so calculus and probability would be helpful though not required.

**Course
in a Nutshell**

We marvel at the high-resolution color images of Mars sent back by the Rovers, of Saturn by Cassini, and by the Hubble Telescope. Closer to home, many have learned to enhance visual materials using tools such as Photoshop and Paint Shop.

In this course, you will learn the principles, algorithms and technologies for acquiring, enhancing, transmitting, and analyzing digital images including: Histograms and other analytical tools, digital image/video perception, optimal quantization and image compression, image transformations, digital filtering, image analysis techniques, feature extraction, capabilities and limitations of image processing tools, and practical considerations for specialized fields such as astronomy, biology, consumer-oriented images, engineering, intelligence, medicine, and physics.

Customize It!

We can customize this course to your participants' backgrounds and needs, include/exclude topics to cater to your image processing applications, and shorten/lengthen the course duration.

Learn About:

- Technology behind digital photography
- Differences between digital and film photography
- Tools available in your camera and in image processing applications
- Low and high bit depth images and what you can do with them
- Filtering methods and how they can enhance images
- Light sensitivity and physical limitations on image capture
- Noise in images and how to deal with it
- How to extract low-contrast images from noise
- Basics of mathematical tools such as Point Spread Function and Modulation Transfer Function and what they tell you
- High Dynamic Range (HDR) images

Course Outline

- Introduction to digital image processing
 - What is a digital image?
 - Digital image fundamentals
 - Pixels and quantization
 - Fundamental steps in image processing
 - Components of an image processing system
- Human vision and perception
 - Capabilities of the eye
 - Comparison of eye and camera images
- Image enhancement in the spatial domain
 - Gray level transforms
 - Histogram processing
 - Other logic and arithmetic operations
 - Spatial filtering
- Image enhancement in frequency domain
 - Frequency-domain filters
 - Sharpening filters
 - Homomorphic filtering
 - Fourier transform
 - Convolution and deconvolution
- Image degradation and restoration
 - Half toning
 - Noise and noise models
 - Restoration with noise-only spatial filtering
 - Noise reduction by frequency domain filtering
 - Inverse filtering
 - Other filtering and transformations
- Color image processing
 - Color models and perception
 - Color transformations
 - Smoothing and sharpening
 - RGB, CMYK and color spaces
- Image compression
 - Lossy and lossless compression
 - Fundamentals
 - Models
 - Information theory
 - Standards and standard image types
- Wrap-up: Course recap and discussion

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