

Image Science/Image Quality Seminar

[6-8 hours class time] Introduction

Overview: The central focus of the seminar is to teach the attendees the process by which high quality images are obtained and the techniques for measuring that quality. While individual parametric equations may be specific to photographic print images, the process can be generalized to other image display modalities. Hence the emphasis is placed on the 'why' and 'how' of image science and less on the 'what' of digital printing. Familiarity with integral calculus and Fourier Analysis is helpful but not required. Worked examples will be furnished.

Seminar Outline

Image Science Vs Image Quality

Image Quality

- What is Image Quality
- How do we measure Image Quality

Image Science

- System Primitives
- Technology specs
- Predictive models
- Information Theoretic metrics
- Perceptual Metrics

Image Science in Development Cycle

- Image Science is predictive of Image Quality
- Image Quality is 'feedback' to design parameters
- Phases of development
 - Pre-Prototype—Simulation models
 - Prototyping—System primitives
 - Market Test—Direct measurement of IMQ

Components of Image Quality

- Color—Tone
- Sharpness



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Noise

Artifacts

Color Science

Role of the observer

Metamerism

Nature of Color Vision

Trichromatic

Actinic Models

Color Spaces

CIELAB

sRGB sYCC

Color Reproduction

Role of memory colors

Micro Image Science

Spatial information

Linear System Theory

Role of the Observer

Spatial information

Information

Noise

Predictive Metrics

Visual Information content

Error metrics weighted by visible content

Error metrics weighted by scene content

Color Reproduction metrics

Delta E*

Open Questions

Spatial metrics

SQF

Granularity

Image Quality Metrics

Color error weighted Minkowski Metrics

Statistical Metrics

System Variability

Peak Quality vs. Statistical distribution of Image Quality

Scene Content Variability

References and Bibliography