Acquisition of Lighting and Reflectance for People, Objects, and Environments

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Abstract

Recent advances in computer graphics for cinema and video games have resulted from new uses of digital photography to digitize human faces, measure reflectance properties, and reconstruct lighting from real-world scenes. This workshop will describe these recent techniques of High Dynamic Range Imaging (HDRI), Image-Based Lighting (IBL), Image-Based Relighting (IBRL) and their use to create photoreal 3D environments and photoreal digital actors. Each topic will include both the underlying theory as well as information to use the techniques in practice, with several examples from recent feature films and video games.

1. High Dynamic Range Imaging (HDRI)
    1. Radiometric Camera Calibration
    2. Assembling HDR Images
    3. HDR Image file formats
    4. HDR Motion Blur
    5. HDR Image Processing in HDR Shop
    6. Tone Mapping
2. Image-Based Lighting (IBL)
    1. Techniques for Shooting Light Probe Images
    2. Basic IBL with Global Illumination
    3. IBL in 3D Environments
    4. Modeling Light Sources from HDRI maps
    5. Recovering the Sun
    6. Useful IBL Approximations
    7. Importance Sampling Techniques
3. Photoreal Digital Actors
    1. An Overview of Realistic Digital Actors
    2. Skin Reflectance Models
    3. Light Stage capture for "Spider Man 2" and "Superman Returns"
    4. The "Digital Emily" project
    5. Techniques for "The Curious Case of Benjamin Button" and "Avatar"
    6. Remaining Challenges

Syllabus: High Dynamic Range Imaging, Image-Based Lighting, Image-Relighting, BRDFs, Surface Reflectometry, Photometric Stereo, Structured Light, Global Illumination, Face Modeling, Facial Animation