Cameras
&
Image Collections

Summary

Visual Information
And
Image Acquisition

Main Topics

- Mathematical Concepts
  - Plenoptic Function
  - Light Fields (2D, 3D, 4D)
- Cameras and Lenses
  - Need for Optics / Pinhole Geometric Optics (Diffraction / Refraction)
  - Lenses (Focal Lenght, Focusing)
- Cameras and Light Fields
  - 4D Light Fields (two plane parametrization)
  - Omnidirectional (projections: lat-long, cube, azimuthal, stereographic)
  - RGB-D (expanded panoramas)

Image Collections

Main Topics

- Historical Perspective
  - Trends (Computational Photography, Image-Based Modeling and Rendering) / Events / Motivation
- Conceptual Framework
  - Definition (Affinity, Support) / New Media Object / Generalization (shape->X, Y->X)
- Controlled Variation
  - Scene / Exposure / View Angle / Subject / Motion / PoV
- Problems
  - Registration / Segmentation / Model Estimation / Fusion / Re-Synthesis
- Mathematical Tools
  - Probability / Statistics / Optimization (Energy Functionals)
- Computational Techniques
  - Image Processing / Computational Geometry / Graph Theory
- Applications
  - Panoramas / HDR / Flash / Denoising / Photomontage / Etc..
- Deep Learning
  - Framework (Collection + Affinity + Model) / Datasets / Devices