Geometry for 3D Graphics
and
Computer Vision

Summary

Geometry for 3D Graphics

Main Topics

- The Geometry for 3D Graphics

  - Uses (Modeling, Rendering/, Animation) / Computation (Elements, Operations)

- The Euclidean Space

  - Metric / Coordinates & Bases / Transformations

- The Projective Space

  - Model / Structure / Homogeneous Coordinates / Projective Transforms

- Geometric Operations

  - Transforming Objects (Points, Directions, Lines) / Intersection / Tangent Planes

- Metrics

  - between Point Sets / Chamfer & Earth Mover's / in Optimization

Computer Vision

Main Topics

- Projective Geometry

  - Cameras & Images / Plenoptic Function & Light Fields

- Vision Problems

  - Camera Calibration / Shape Reconstruction / (One Image, Many Images, Depth Image)

- Pinhole Camera Model

  - Vision & Graphics Models / Camera Tranformation

- Fundamental Equation

  - Variants (Single & Multi View) / Problems & Strategies

- Scenarios for Metrology

  - Single View (Camera Calibration, Reconstruction) / Multi View (Stereo, SFM, Self-Calibration)

- Concepts

  - Epipolar Geometry / Fundamental Matrix / Essential Matrix

- Camera Calibration

  - Algorithms (DLT, Zang, Tsai) / COLMAP