

Notes on *An Invitation to 3-D Vision* by Ma, Soatto,
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Chapter 1

Introduction

- 1.1 Visual perception from 2-D images to 3-D models
- 1.2 A mathematical approach
- 1.3 A historical perspective

Part I

Introductory Material

Chapter 2

Representation of a Three-Dimensional Moving Scene

In this chapter, we focus on the first fundamental set of transformations central to the geometry of 3D-vision: *Euclidean motion*, or *rigid-body motion*. This is pretty important for modeling how a camera moves. We will start by going into what a Euclidean space is and then spend the rest of the time talking about rigid-body motions.

2.1 Three-dimensional Euclidean space

We are going to use \mathbb{E}^3 to denote three-dimensional Euclidean space.

2.2 Rigid-body motion

2.3 Rotational motion and its representations

2.3.1 Orthogonal matrix representation of rotations

2.3.2 Canonical exponential coordinates for rotations

2.4 Rigid-body motion and its representations

2.4.1 Homogenous representation

2.4.2 Canonical exponential coordinates for rigid-body motions

2.5 Coordinate and velocity transformations

2.6 Summary

2.7 Exercides

2.8 Quaternions and Euler angles for rotations