Binocular Stereo Introduction

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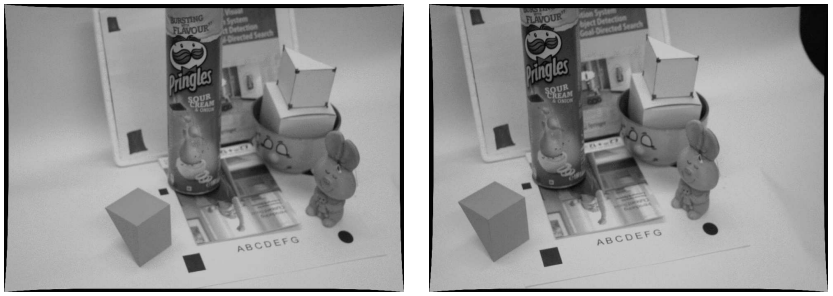
Binocular Stereo System Introduction

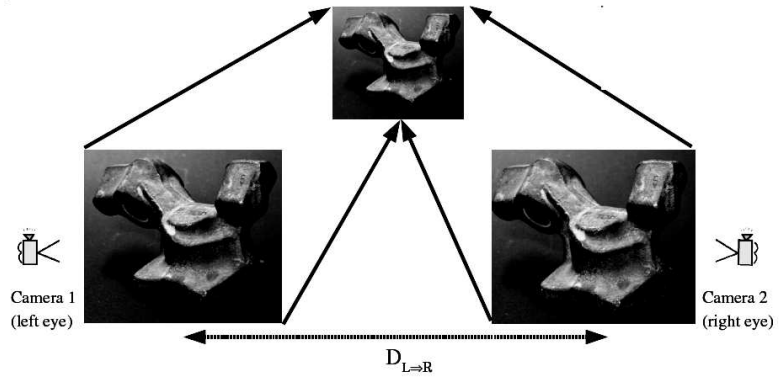
Is there a Wedge in this 3D scene?



Data a stereo pair of images!

3D part recognition using geometric stereo

Binocular Stereo Vision



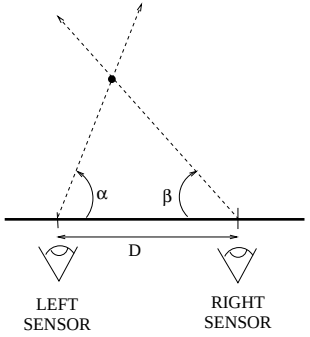
Given two 2D images of an object, how can we reconstruct 3D awareness of it?

Binocular Stereo

Goal: build 3D scene description (eg. depth) given two 2D image descriptions

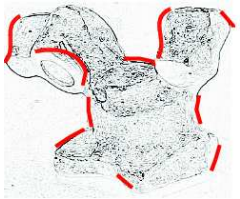
Useful for: obstacle avoidance, grasping, object location

Key principle: triangulation

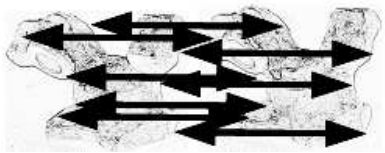


Stereo vision - a solution

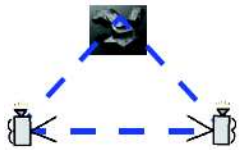
1) **Feature extraction**



2) **Feature matching**:

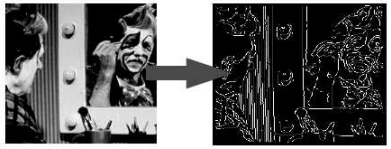


3) **Triangulation**:

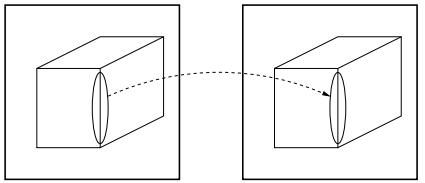


Possible image features

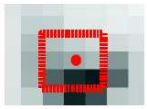
1) **Edge fragments**



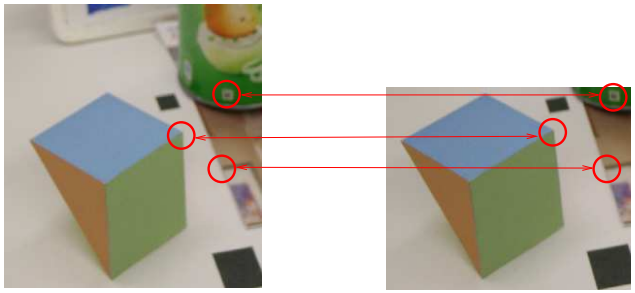
2) **Edge structures (eg. vertical indoor lines)**



3) **General interest points (eg. SIFT)**



4) **Image intensity patches** - everywhere in image



Larger features easier to match but harder to get and less dependable

Human visual system thought to work at edge fragment level

Stereo Recognition System Overview

1. **Feature extraction**:
   Canny edge detector
   RANSAC straight line finding
2. **Feature matching**:
   Stereo correspondence matching lines
3. **Triangulation**:
   3D line feature position estimation
4. **3D object recognition**:
   3D geometric model
   Model-data matching
   3D pose estimation

What We Have Learned

- Core steps in stereo: find features, match features, geometry
- Geometry trivial
- A variety of matchable features: points, edges, lines, patches