Local Image Matching

Hyun Soo Park
RECALL: SIFT FEATURE MATCHING
SIFT Descriptor

Local visual descriptor.
SIFT Descriptor

Local visual descriptor
**Feature Similarity ~ SSD (Sum of Squared Distance)**

\[
\| \text{descriptor}_1 \| - \| \text{descriptor}_2 \| = 0
\]
Nearest Neighbor Search

Feature match candidates

descriptor1 - descriptor2
Nearest Neighbor Search

Feature match candidates

descriptor1

descriptor2
Feature Discriminativity
**Feature Discriminativity**

**Discriminativity:** how is the feature point unique? Feature match candidates
**Feature Discriminativity**

**Discriminativity**: how is the feature point unique?

\[
\frac{d_1}{d_2} < 0.7
\]
FEATURE DISCRIMINATIVITY

![Graph showing PDF for correct and incorrect matches](image URL)
Nearest Neighbor Search w/o Ratio Test

Left image → right image
Nearest Neighbor Search w/ Ratio Test

Left image → right image
Nearest Neighbor Search w/o Ratio Test

Left image ↔ right image
Nearest Neighbor Search w/ Ratio Test

Left image ← right image
**Bi-directional Consistency Check**

Consistency: would a feature match correspond to each other?
Bi-directional Consistency Check
SIFT Feature Matching

NASA Mars Rover images
SIFT Feature Matching

NASA Mars Rover images with SIFT feature matches
Figure by Noah Snavely
SIFT Feature Matching

NASA Mars Rover images with SIFT feature matches
Figure by Noah Snavely
OBJECT RECOGNITION

Computer Vision
A Modern Approach
Forsyth, Ponce

Computer Vision
A Modern Approach
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Books and notes on a desk.
LOCAL FEATURE MATCHING
IMAGE WARPING
Computer Vision
A MODERN APPROACH
FORSYTH • PONCET