How Many Correspondences?

What is minimum m?
Local Scale Invariant Feature Transform (SIFT)

SIFT automatically finds the optimal scale of feature point and its orientation.

Desired properties:
• Repeatability: the same point is repeatedly detected.
• Discriminativity: the point is unique.
• Orientation aware

More detail from CSCI 5561
Local Scale Invariant Feature Transform (SIFT)
Local Scale Invariant Feature Transform (SIFT)
Local Scale Invariant Feature Transform (SIFT)

\[ \text{descriptor}_1 - \text{descriptor}_2 = 0 \]
Local Scale Invariant Feature Transform (SIFT)
Nearest Neighbor Search

Feature match candidates

d_2

d_5

d_3

d_4

d_1

descriptor1

descriptor2
Nearest Neighbor Search

Discriminativity: how is the feature point unique?

Feature match candidates
Nearest Neighbor Search w/ Ratio Test

Discriminativity: how is the feature point unique?

\[
\frac{d_1}{d_2} < 0.7
\]
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
Nearest Neighbor Search w/ Ratio Test

Left image ↔ right image
Bi-directional Consistency Check

Consistency: would a feature match correspond to each other?

Feature match candidates
Bi-directional Consistency Check