Detecting Bilateral Symmetry with Feature Mirroring

Colorado State University
Quanyi Mo, Bruce Draper
General Strategy

• Finding candidate bilateral symmetric pairs of local patches
  – Previous method: Finding closest matching for each points (Loy, et al. 06’)
  – Ours: Grouping sets of points, take all pairs within them
• Candidate pairs vote for symmetry axis
  – Previous method: Hough vote weighted by orientation, scale…
  – Ours: Simple Hough vote is enough
• Why?
  – SIFT detection is not perfect(local patch, invariance)
  – Aim at real world image(multi-way, imperfect symmetry)

Overview of method

Detecting interest points & Mirroring SIFT descriptors

Construct distance measure & Clustering

Hough voting on symmetric axis through all-pair-within-clusters
Clustering by Symmetry
Mirroring SIFT descriptors

original patch A

perfect mirror patch B
Distance measure of bilateral symmetry

\[ \text{Dist}(i, j) = \| d_i - d_j^{\text{mirror}} \|_2 + \| d_j - d_i^{\text{mirror}} \|_2 \]
Clustering by Symmetry
Sample results (1/5)

Detection speed: 160 SIFT points, 0.32 second
Sample results (3/5)

175 SIFT points, 0.27 second

124 SIFT points, 0.18 second
Sample results (5/5)

214 SIFT points, 0.33 second

505 SIFT points, 0.82 second
Summary

Method: Define symmetry measure,
  + Spectral clustering
  + Hough voting

Revision:
  Ward's linkage hierarchical clustering is used instead for obtaining deterministic result, similar performance

Code is available by request to qmo@cs.colostate.edu
Thank You!