HIGH-RESOLUTION FEATURE EVALUATION BENCHMARK

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Reference Benchmark for Affine Invariant Features [1]

Limitations

- Resolution of 0.5 megapixels
- Radial distortion
- Violated homography assumption (c. f. example)

Estimation Method

- Based on image features
- Standard homography estimation approach

Image $\mathtt{I}_3$ Mapped $\mathtt{I}_1$ to $\mathtt{I}_3$ Difference Image

Contribution

New Benchmark Images with Corresponding Homographies

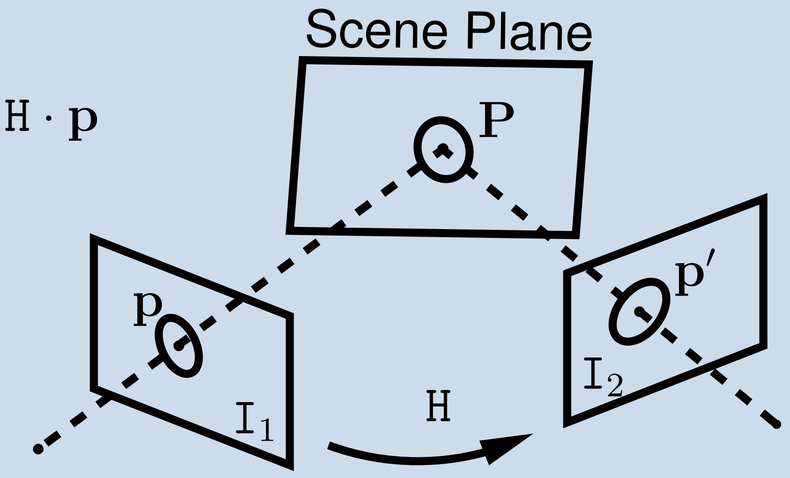
- Image resolutions: 1.5, 3, 6, and 8 megapixels
- Highly-accurate homographies
- Feature independent homography computation [2]

  $\rightarrow$ *Differential Evolution* for minimization of cost function $E(\mathtt{H})$

  $\rightarrow$ $E(\mathtt{H}) = \frac{1}{J}\sum_{j=1}^{J} d_{\mathsf{RGB}}(\mathtt{H}\cdot\mathbf{p}_j, \mathbf{p}'_j)$

  $\rightarrow$ Dense image representation

$\mathbf{p}' = \mathtt{H}\cdot\mathbf{p}$



Example Data Set [3]: *Grace*

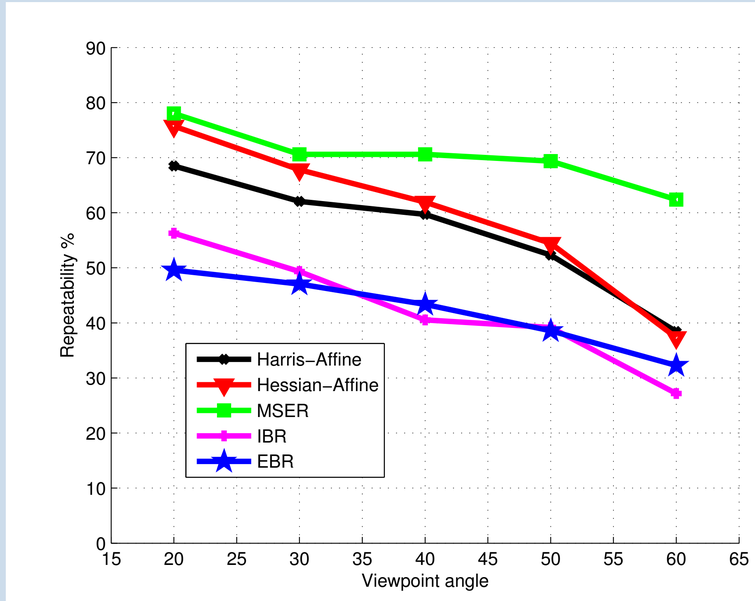
Example Result

Repeatability [4] for Feature Detectors at Different Image Resolutions

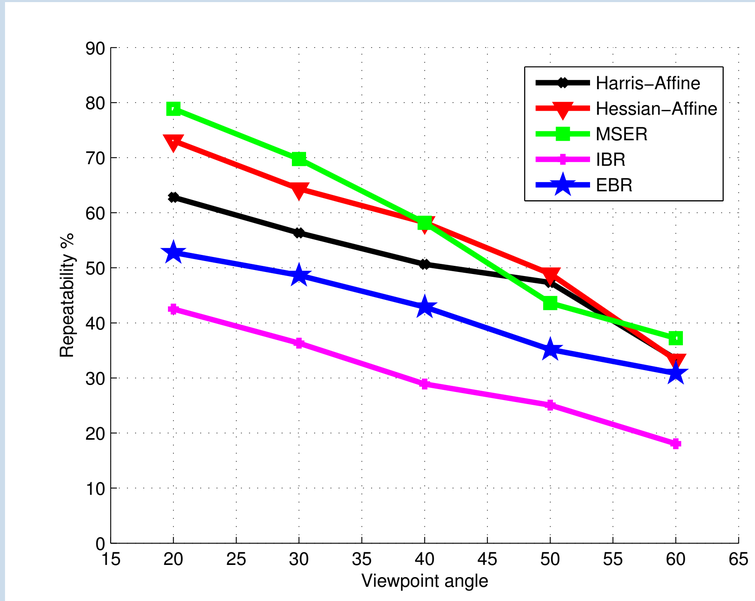
- Different results at different resolutions
- Lower performance at higher resolution

$\Rightarrow$ Evaluation at multiple image resolution important

- We provide [3]: 5 data sets at 4 image resolutions



Grace, 1536×1024



Grace, 3456×2304

[1] Krystian Mikolajczyk et al.: ”A Comparison of Affine Region Detectors”, IJCV 2005
[2] Kai Cordes et al.: ”Increasing the Accuracy of Feature Evaluation Benchmarks Using Differential Evolution”, SSCI 2011
[3] New benchmark data: http://www.tnt.uni-hannover.de/project/feature_evaluation/
[4] Repeatability matlab-code: http://www.robots.ox.ac.uk/~vgg/research/affine/

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