

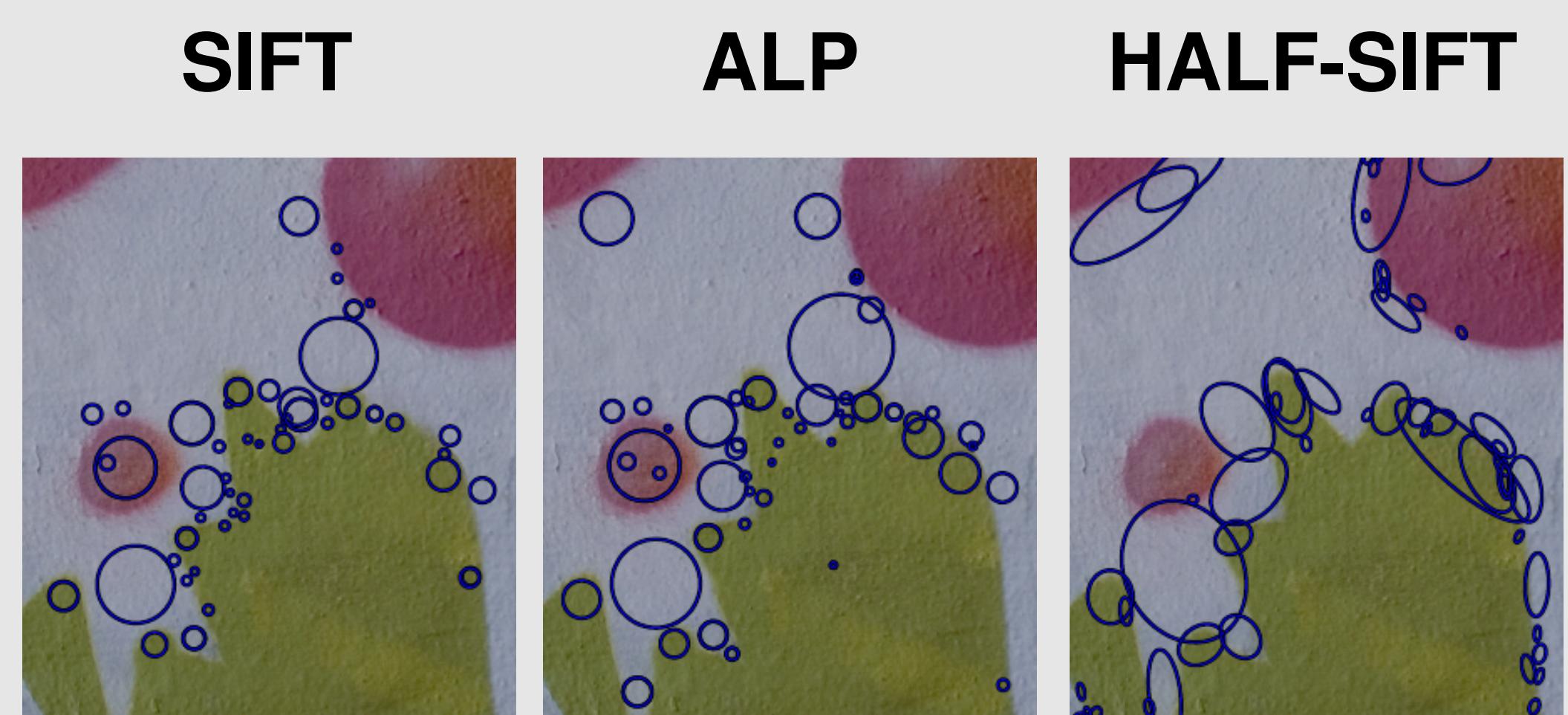
# Localization Accuracy of Interest Point Detectors with Different Scale Space Representations

Kai Cordes • Bodo Rosenhahn • Jörn Ostermann

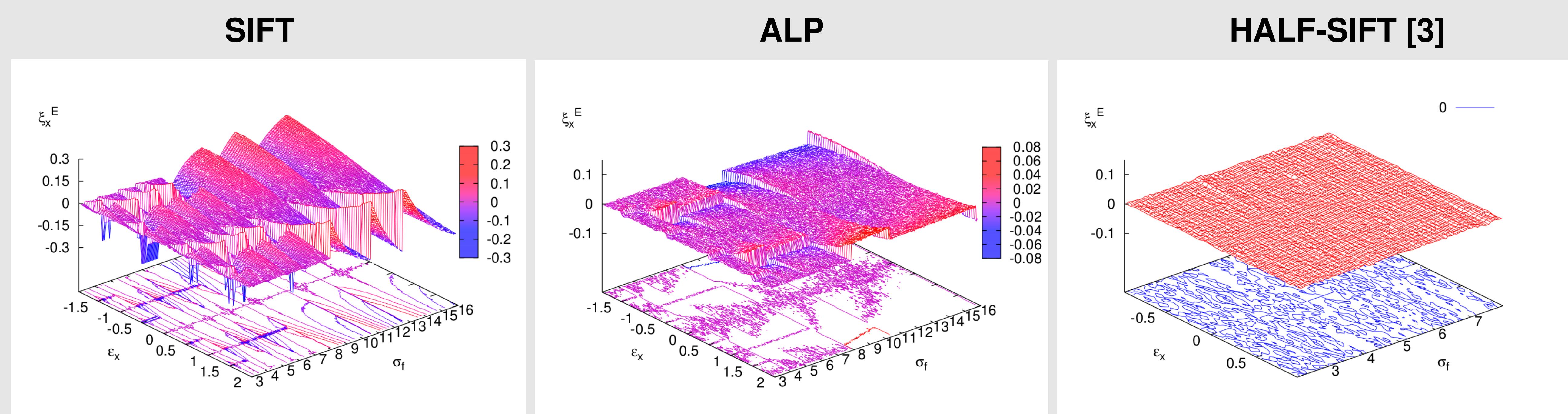
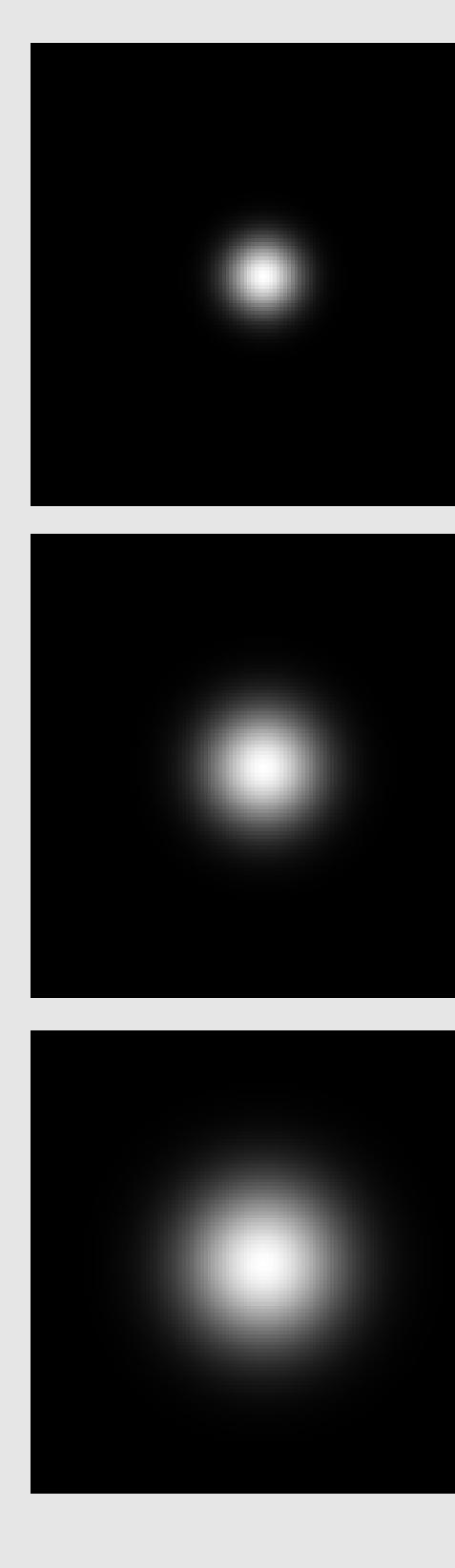
## Accuracy Evaluation of Feature Detectors

- SIFT: restricted usage due to patent [1]
- ALP: licensable alternative to SIFT

Detector	Scale Space	Gradient Approximation
SIFT [1]	DoG	3D quadratic
ALP [2]	LoG	2D quadratic + 1D cubic
HALF-SIFT [3]	DoG	DoG, bivariate

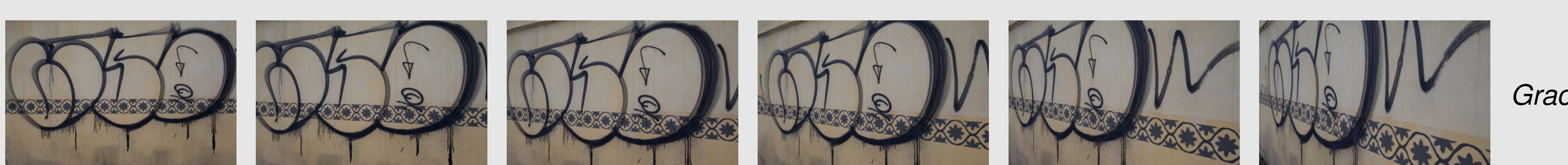


## Evaluation: Gaussian Features

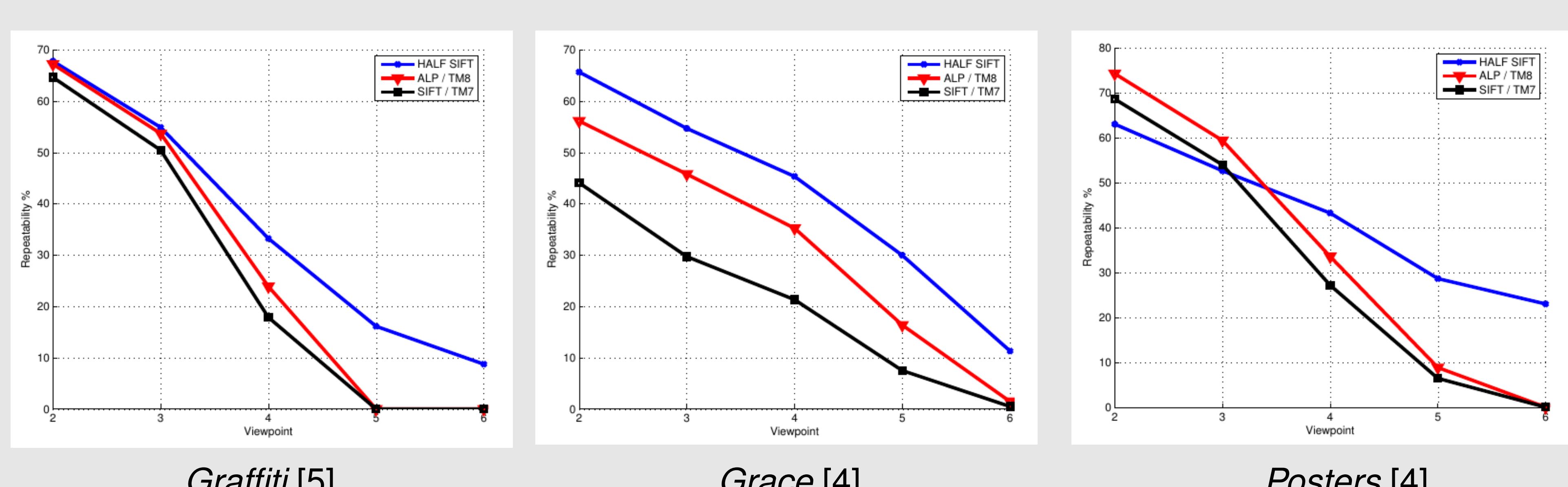


$\xi_x^E$ : localization error depending on subpixel position  $\epsilon_x$  and variance  $\sigma_f$

## Evaluation: Repeatability



- Benchmarks [4, 5]
- Repeatability protocol [5]
- Three examples shown here  
(more in the paper)



## Conclusions

- ALP detector true alternative to SIFT, which has a restricted usage (patent [1])
- ALP even provides higher localization accuracy than SIFT
  - Usage of LoG instead of DoG beneficial
- HALF-SIFT detector still provides best results with DoG scale space representation
  - Recommendation: Combine LoG scale-space with HALF-SIFT approach



[1] D. G. Lowe: "Distinctive image features from scale-invariant keypoints", IJCV 2004, Patent No US 6,711,293

[2] G. Francini, M. Balestri, S. Lepsoy: "CDVS: Telecom italia's response to CE1 - Interest point detection", ISO/ITEC JTC1/SC29/WG11, Doc M31369, 2013

[3] K. Cordes, O. Müller, B. Rosenhahn, J. Ostermann: "HALF-SIFT: High-accurate localized features for SIFT", CVPRw 2009

[4] K. Cordes, B. Rosenhahn, J. Ostermann: "High-resolution feature evaluation benchmark", CAIP 2013

[5] K. Mikolajczyk et. al: "A comparison of affine region detectors", IJCV 2005