The Generalized Laplacian Distance and its Applications for Visual Matching Supplementary Material

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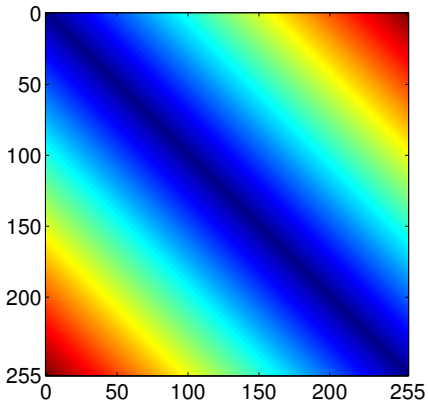
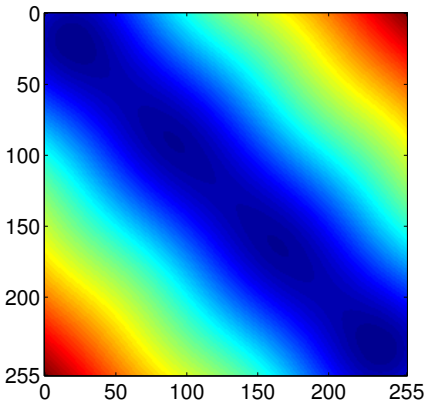
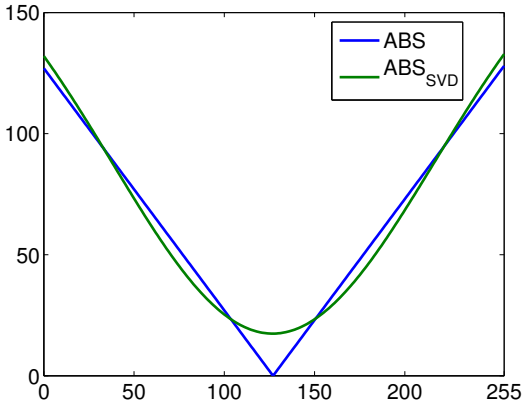


(a) $|x - y|$



(b) SVD, rank 4



(c) $|127 - y|$

Figure 1. SVD Approximation of the absolute difference function $|x-y|$ (where x, y are integers in $[0...255]$). (a) The matrix $H_{xy} = |x-y|$. (b) SVD approximation of rank 4. (c) Row 127 in both matrices, representing $|127-y|$ (where $y \in [0...255]$) and its approximation.

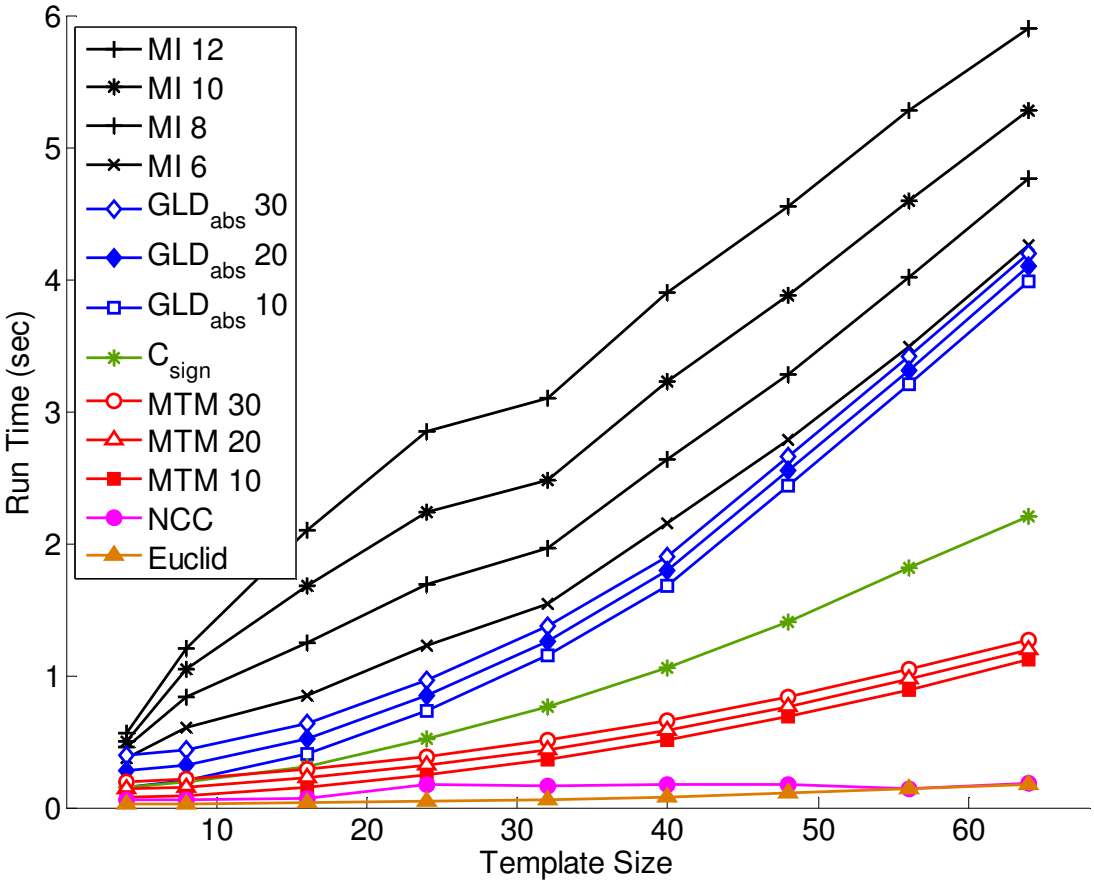


Figure 2. Average execution times for template matching using Euclidean distance, NCC, MTM, C_{sign}, GLD$_{abs}$ and mutual information (MI). The number of bins (K) follows relevant methods. For MTM and GLD$_{abs}$ we show the execution times of the P2W (PB) variants. The W2P (WB) variants are slightly faster.

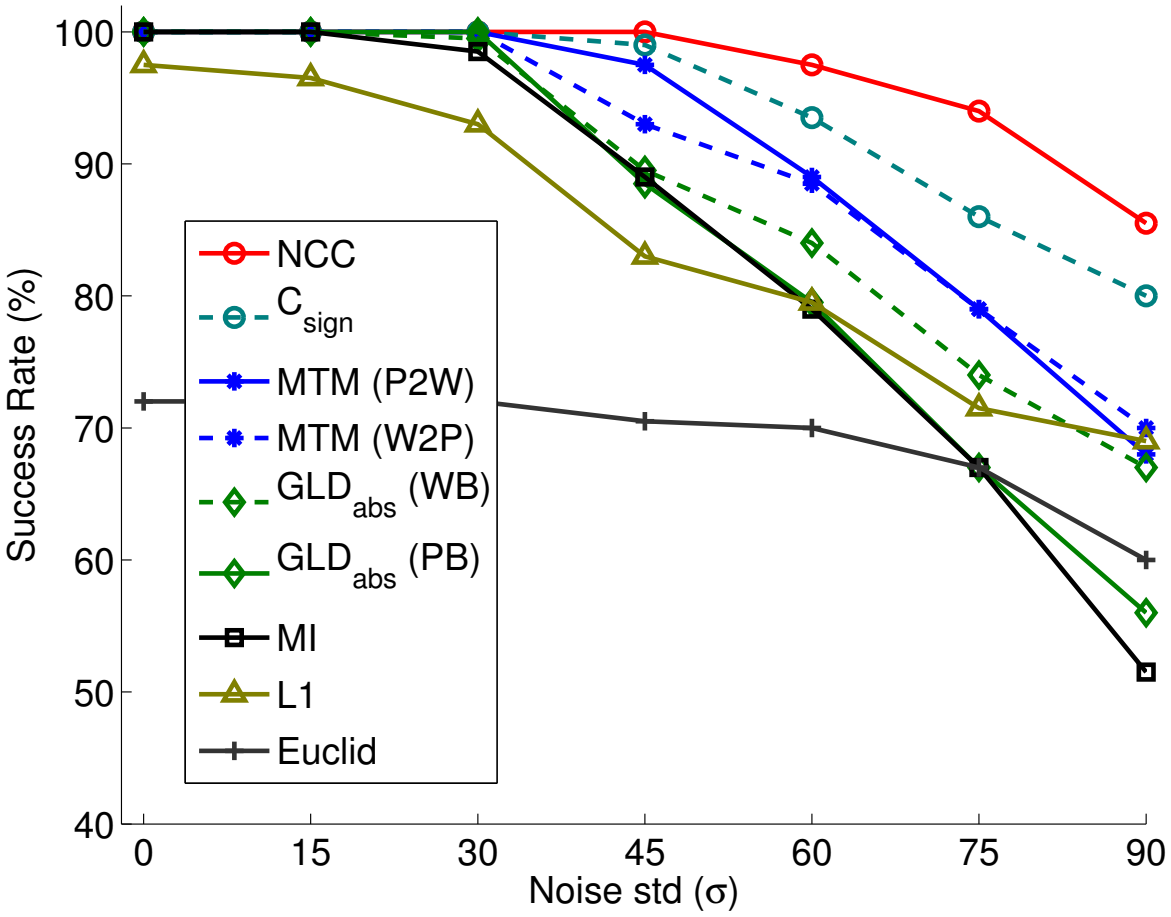


Figure 3. Template matching with random affine intensity transformations and additive Gaussian noise. The template size is 24×24.

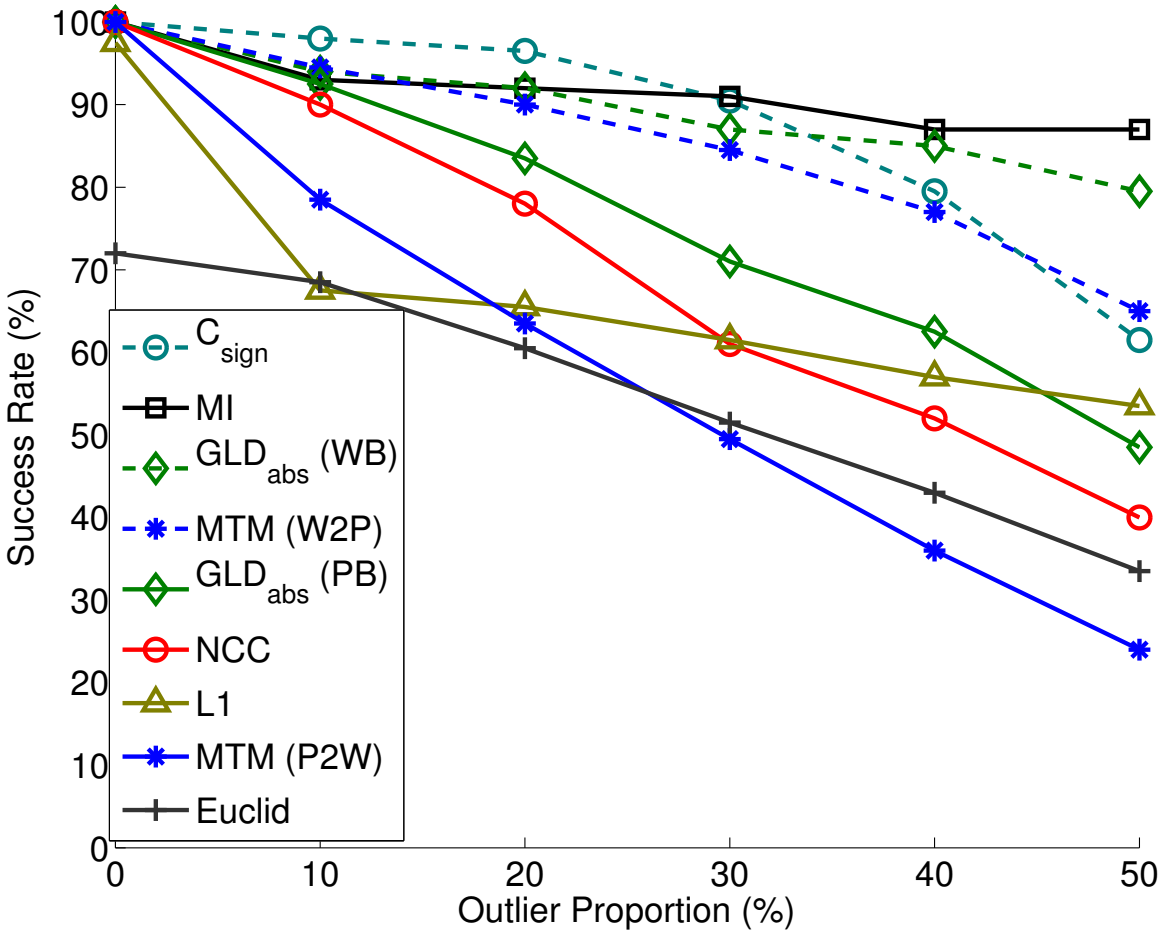


Figure 4. Template matching with random affine intensity transformations and outlier noise (random values in random locations). The template size is 24×24. Note that MI and GLD_{abs} are significantly slower than the other methods (see Figure 2).

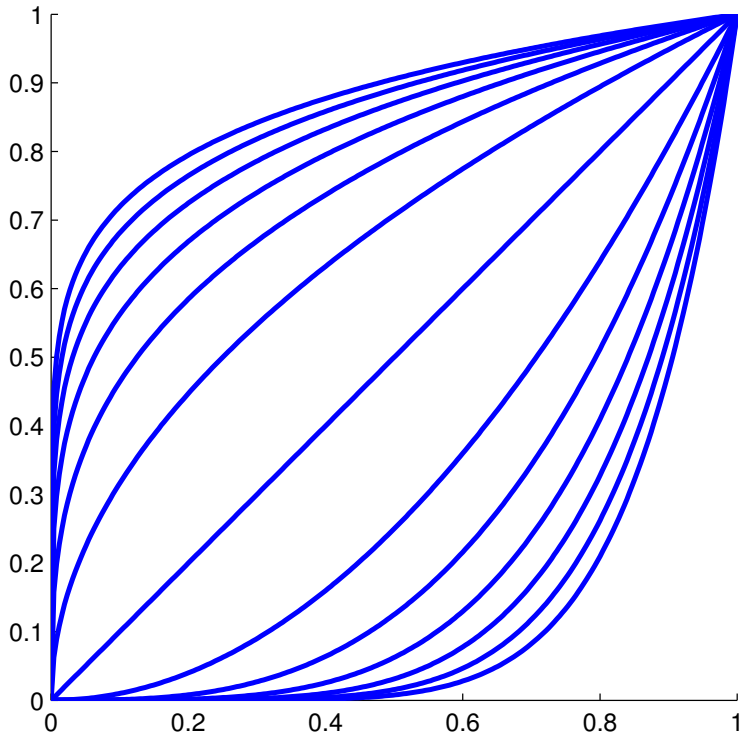


Figure 5. Gamma transformation $f(x) = x^{\gamma}, \gamma = \frac{1}{7}...7$.

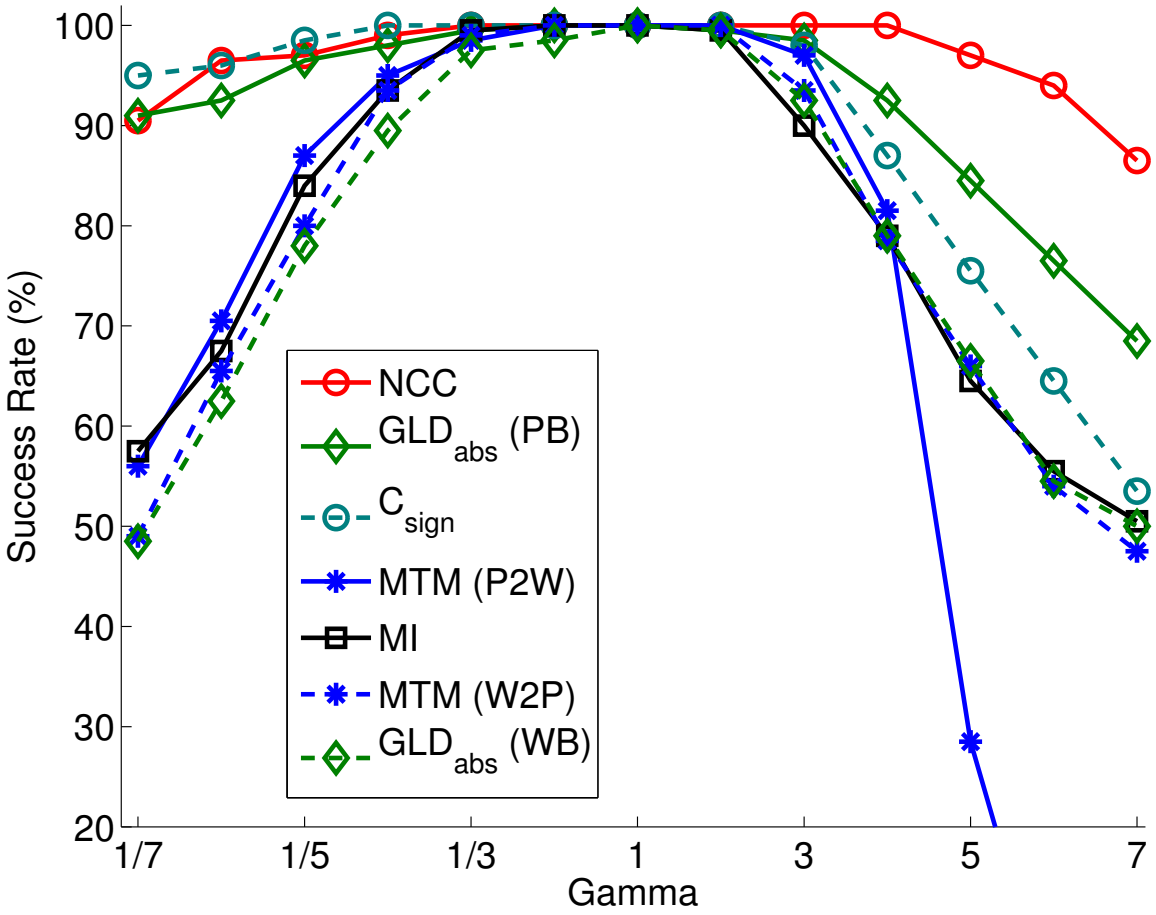


Figure 6. Template matching with Gamma transformations ($\gamma = \frac{1}{7}...7$) and additive Gaussian noise ($\sigma = 15/255$). The template size is 24×24. Note that GLD$_{abs}$ is slower than C_{sign} (see Figure 2).

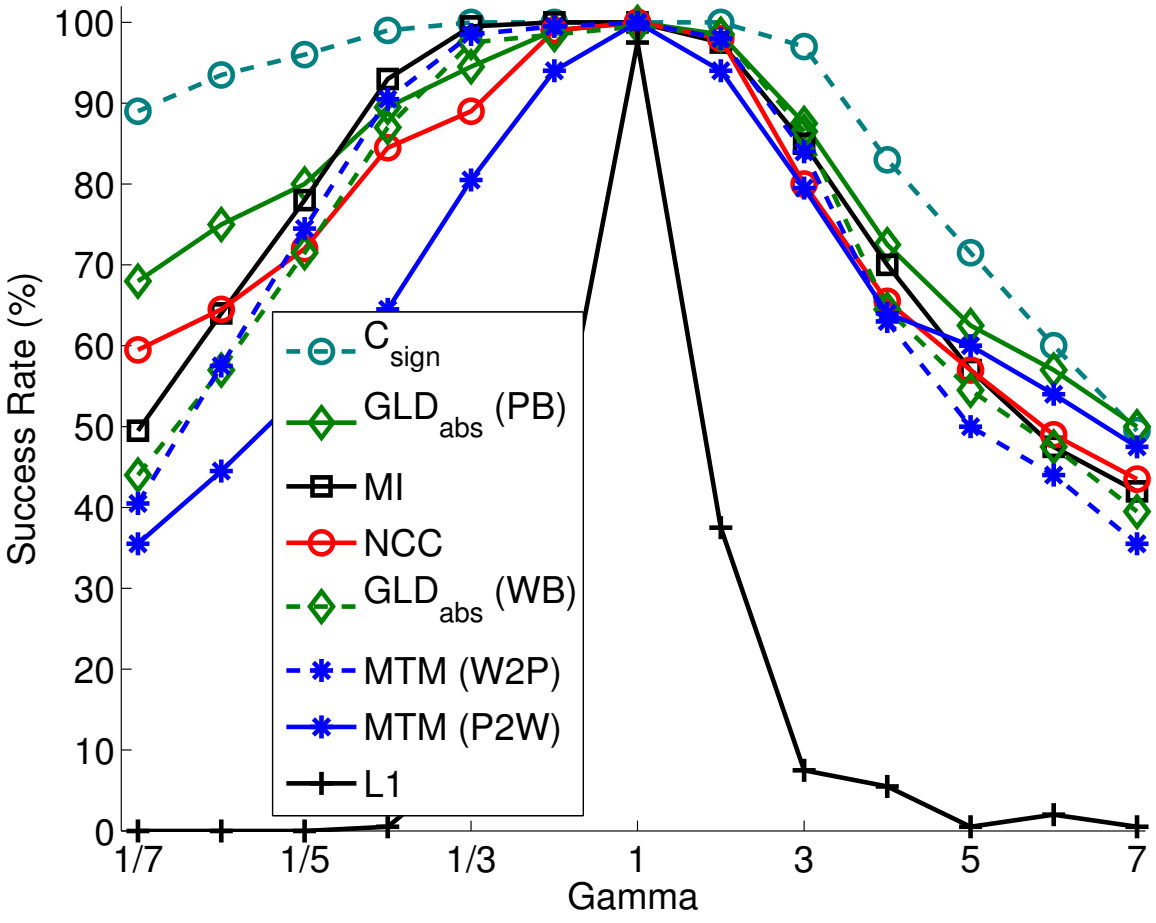


Figure 7. Template matching with Gamma transformations ($\gamma = \frac{1}{7}...7$) and 10% outliers (random values in random locations). The template size is 24×24.

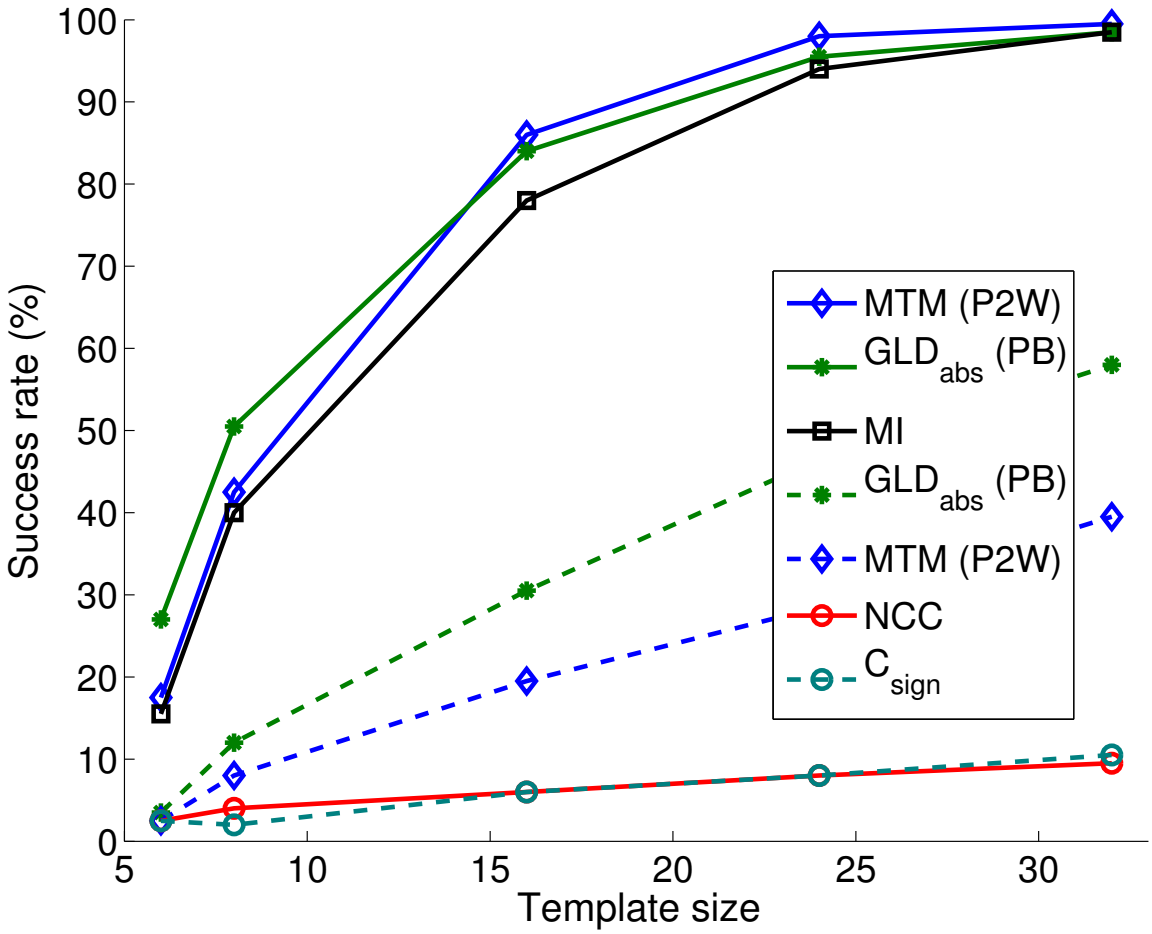


Figure 8. Random tone mapping with Gaussian noise ($\sigma = 15/255$) and varying template size. (We compare methods invariant to affine transformations).

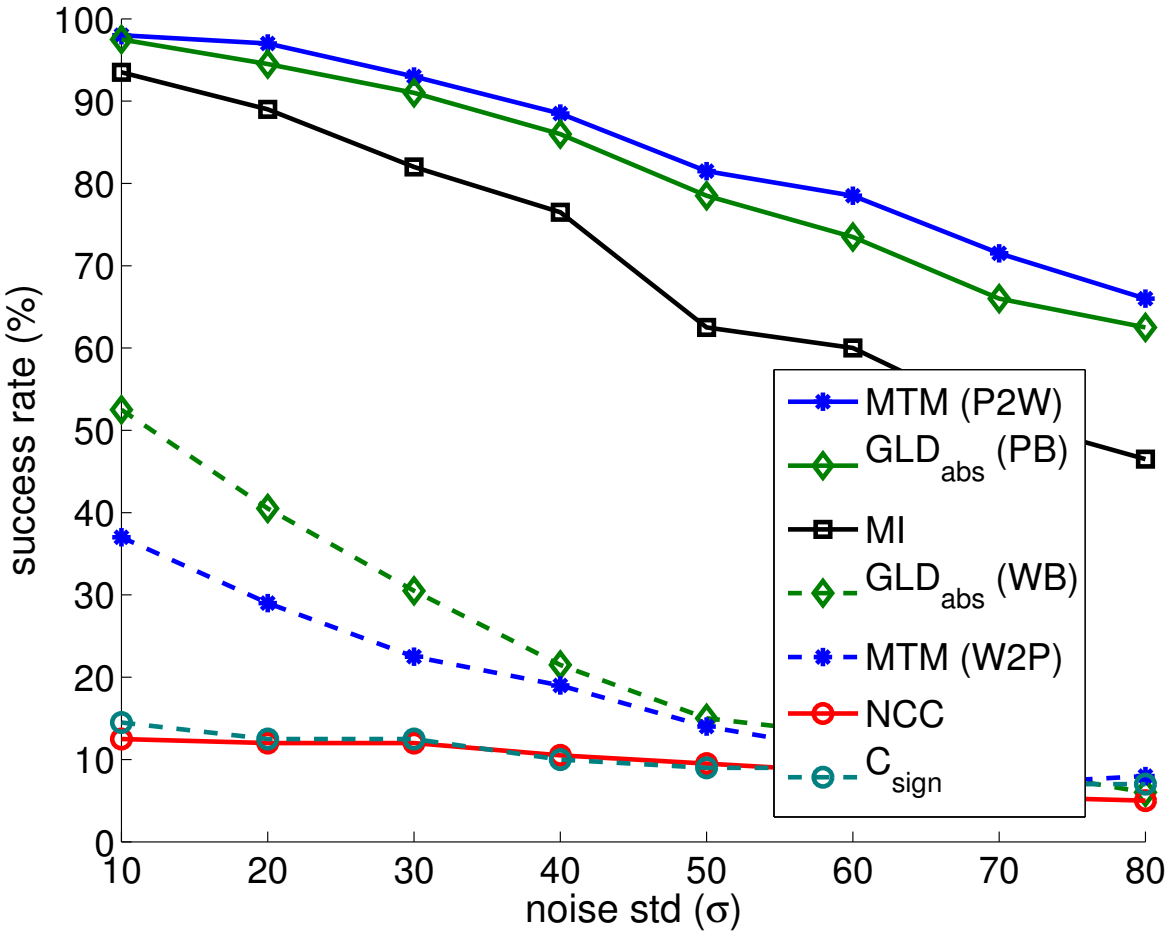


Figure 9. Random tone mapping with template size 24×24 and increasing amounts of Gaussian noise. (We compare methods invariant to affine transformations).

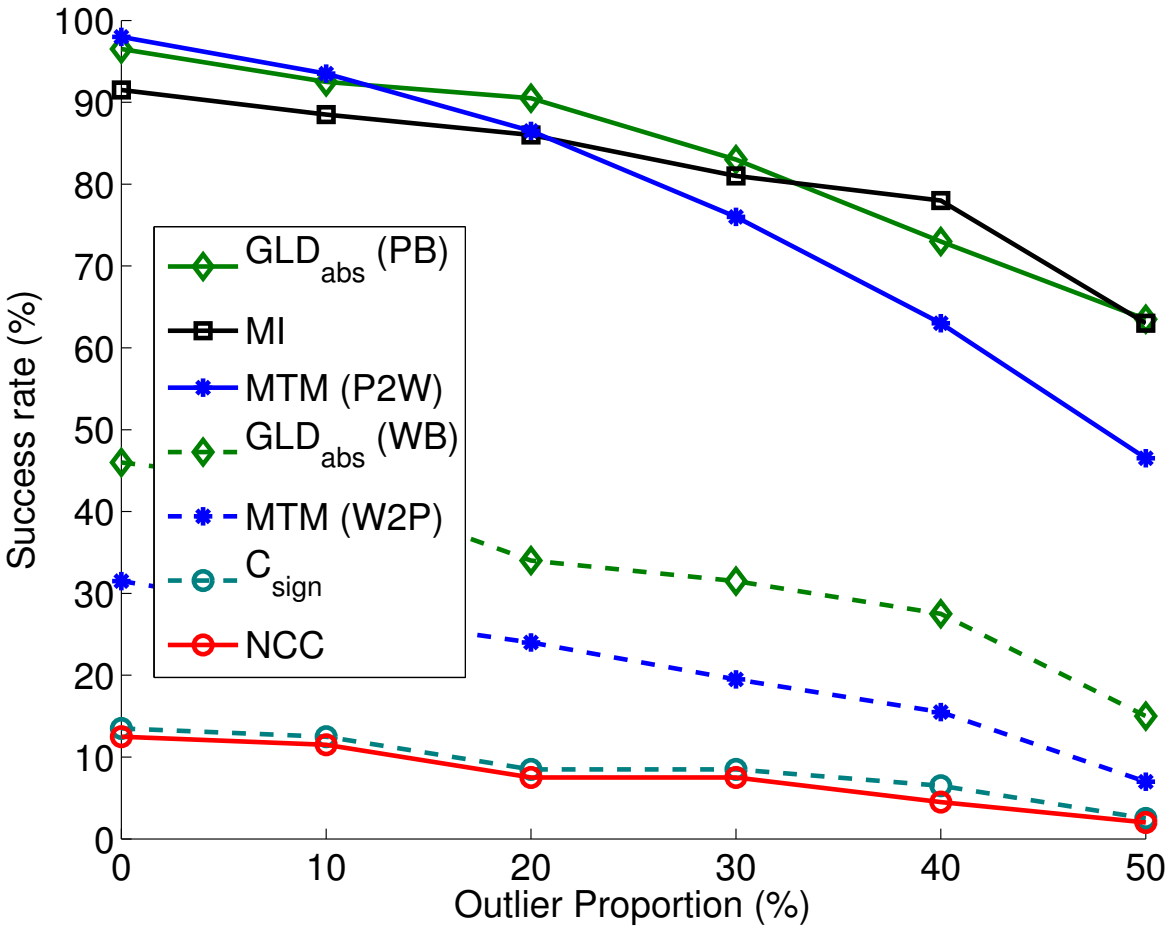


Figure 10. Random tone mapping with template size 24×24 and increasing amounts of outliers (random values in random locations). We compare methods invariant to affine transformations.

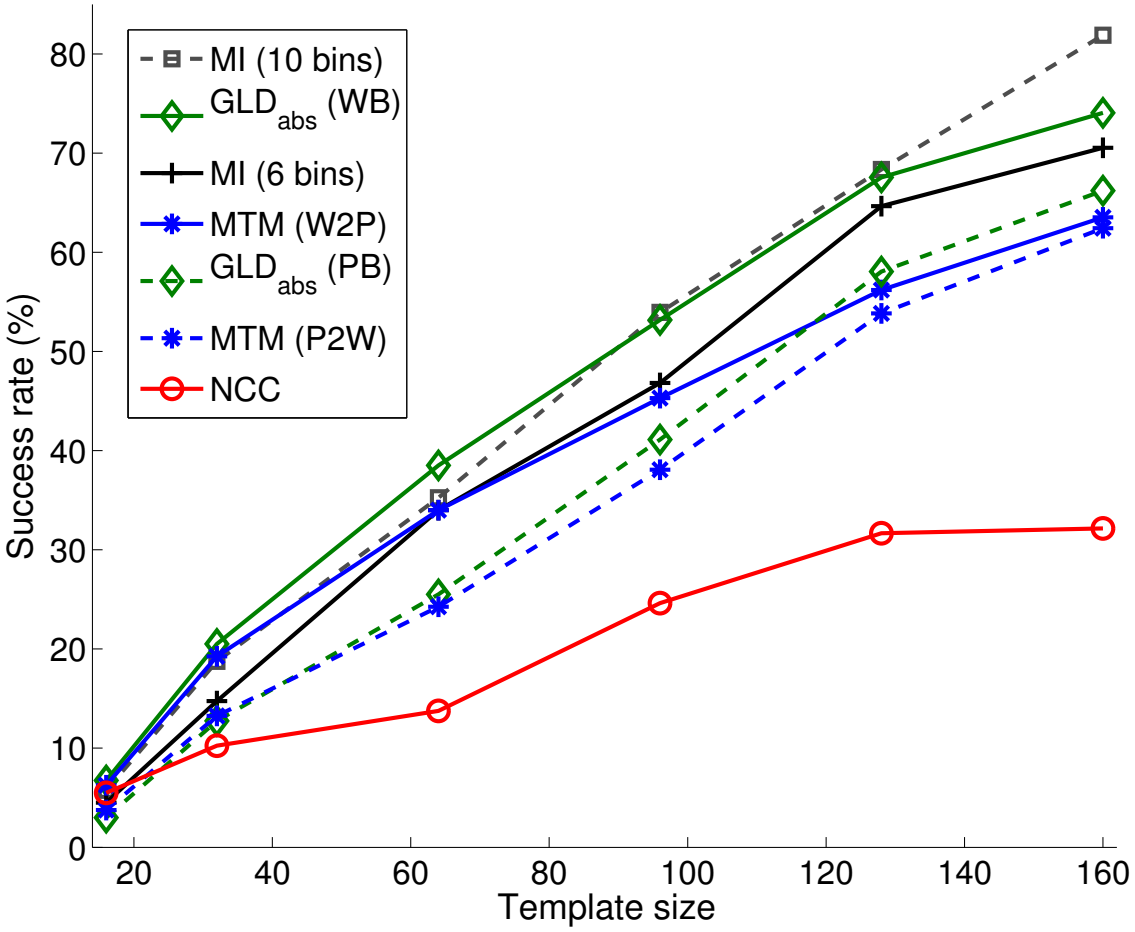


Figure 11. Results of multimodal template matching. GLD_{abs} (WB) is better than MI (6 bins), which has the same runtime, and comparable to the slower MI (10 bins); see Figure 2.