

# Hardware-Efficient Belief Propagation

## Supplemental Material: Results of Middlebury Benchmarks

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# TABLE 1

## COMPARISON OF ENERGIES

Application <i>Dataset</i>	Binary Image Segmentation			Denoising/Inpainting		Stereo Matching			Photomontage	
	<i>Flower</i>	<i>Person</i>	<i>Sponge</i>	<i>House</i>	<i>Penguin</i>	<i>Tsukuba</i>	<i>Venus</i>	<i>Teddy</i>	<i>Family</i>	<i>Pano</i>
ICM	113.85%	131.59%	109.71%	111.26%	132.91%	653.36%	405.11%	234.30%	1620.87%	528.25%
Expansion	100.00%	100.00%	100.00%	102.79%	104.38%	100.44%	102.56%	100.52%	102.26%	101.99%
Swap	100.00%	100.00%	100.00%	100.91%	112.58%	100.82%	103.08%	100.84%	197.10%	104.41%
BP-S	100.09%	100.04%	100.02%	100.25%	101.33%	115.66%	110.20%	106.96%	1966.02%	567.98%
BP-M	100.04%	100.02%	100.00%	100.15%	101.40%	110.20%	101.70%	104.20%	341.45%	188.21%
Tile-based BP	100.04%	100.02%	100.00%	100.09%	101.16%	107.51%	101.07%	103.57%	605.12%	290.02%
TRW-S	100.00%	100.00%	100.00%	100.00%	100.03%	100.02%	100.02%	100.62%	101.09%	115.30%

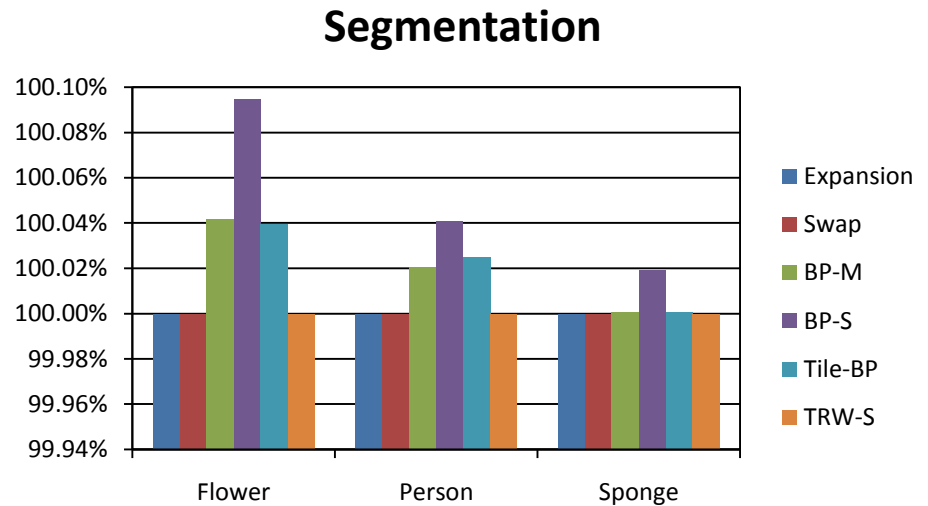
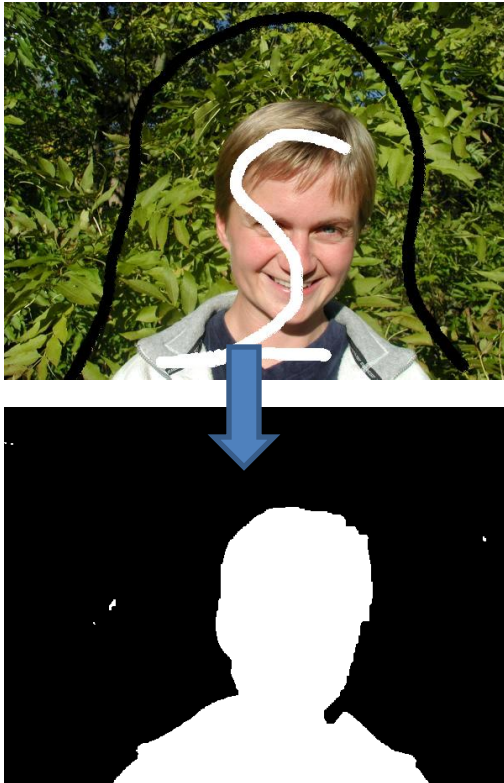
*The energies are measured relative to the maximum lower bound obtained by TRW-S.*

*For ICM, Expansion, Swap, BP-M, BP-S, and TRW-S, each algorithm is performed for at most 500 iterations.*

*For tile-based BP, the block size is 16, the number of the inner iteration is 20, and the number of the outer iteration is at most 20.*

# Image Segmentation

- Three datasets
- Graph-cut based algorithms are better than message-passing ones
- Tile-based BP is comparable to BP-M



# Results



Expansion



Swap



BP-S



BP-M



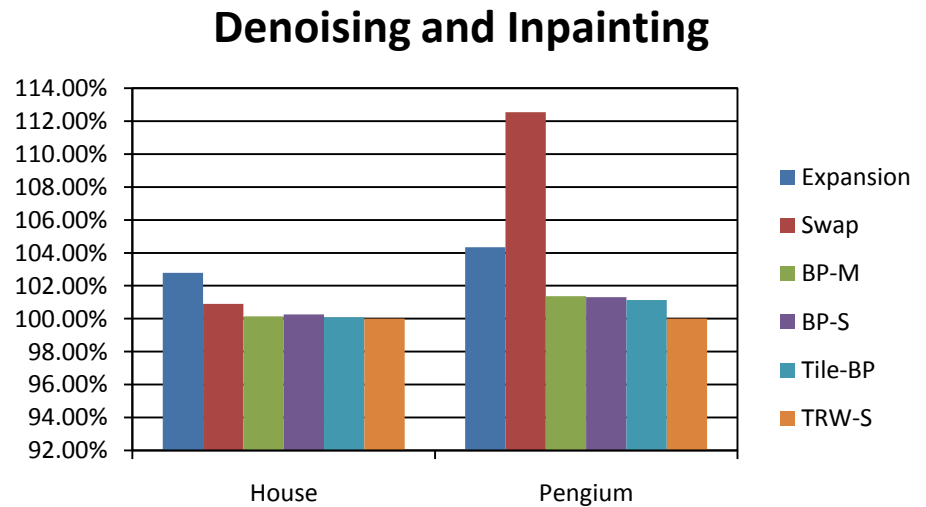
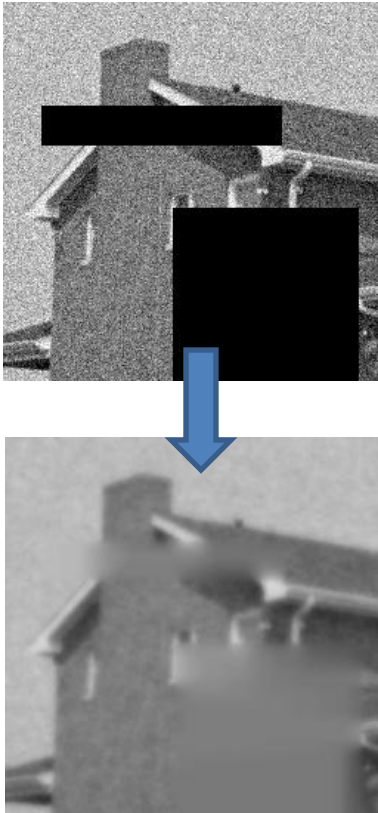
Tile-based BP



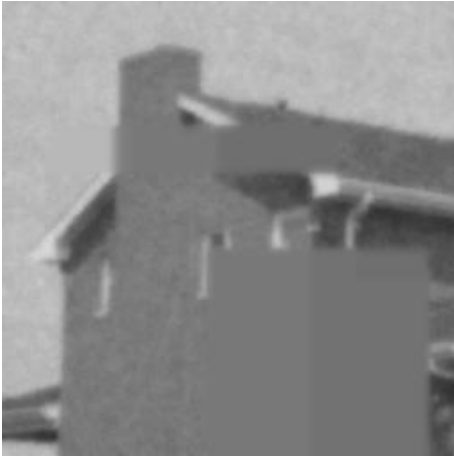
TRW-S

# Image Denoising and Inpainting

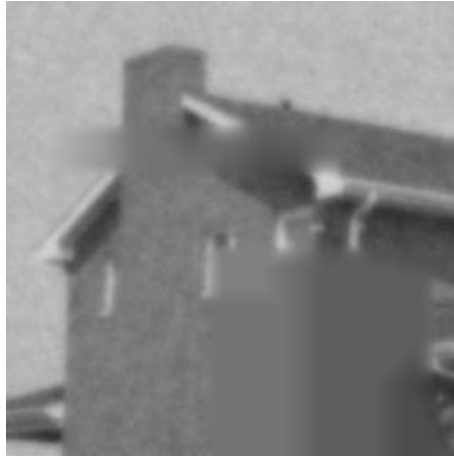
- Two datasets
- Message-passing algorithms are better than graph-cut based ones
- Tile-based BP is comparable to BP-M



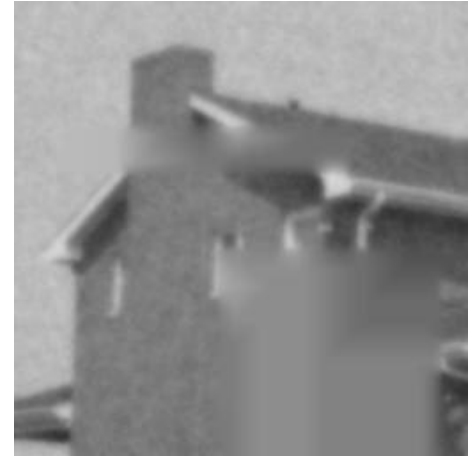
# Results



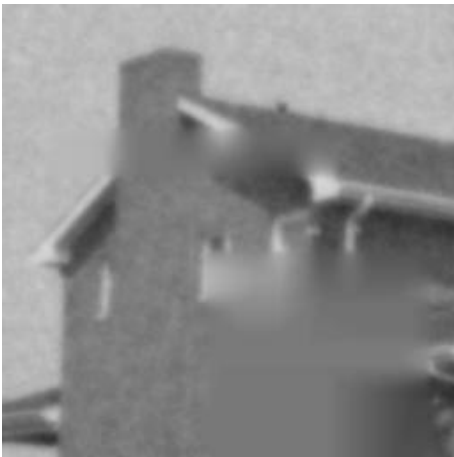
Expansion



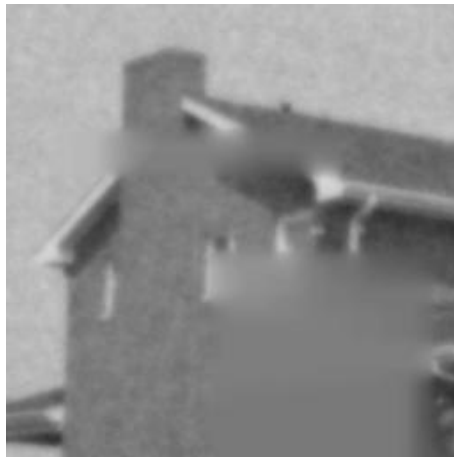
Swap



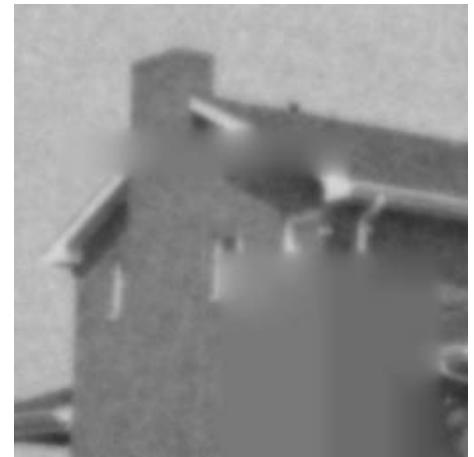
BP-S



BP-M



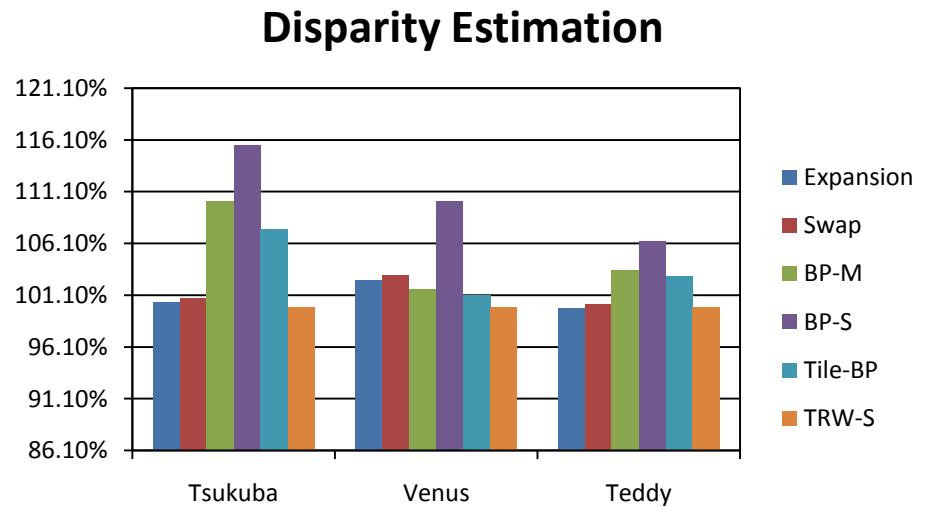
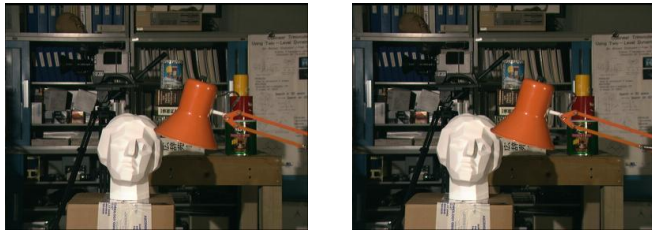
Tile-based BP



TRW-S

# Disparity Estimation

- Three datasets
- No single algorithm works well for all datasets
- Tile-based BP is better than BP-M and BP-S



# Results



Expansion



Swap



BP-S



BP-M



Tile-based BP



TRW-S