Solving Sudoku Puzzles With Computer Vision

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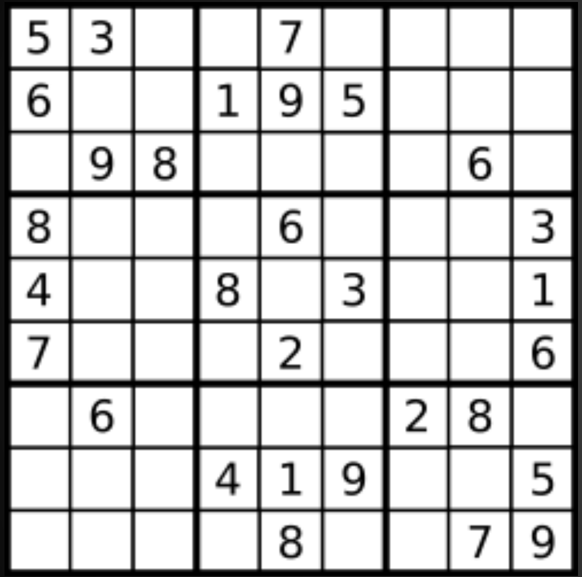
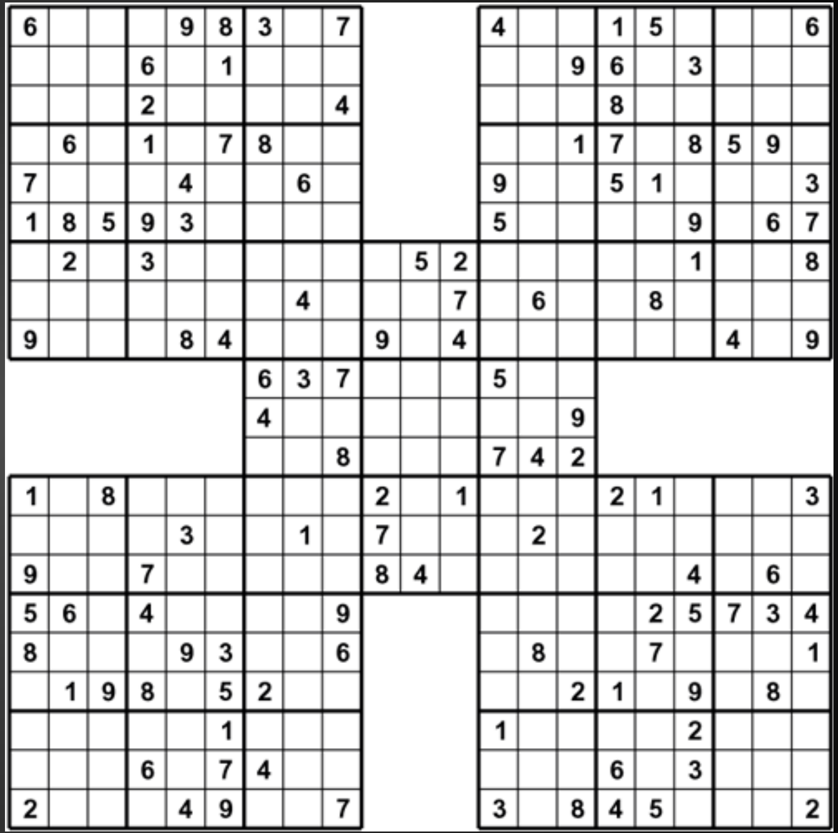
Sudoku Puzzles





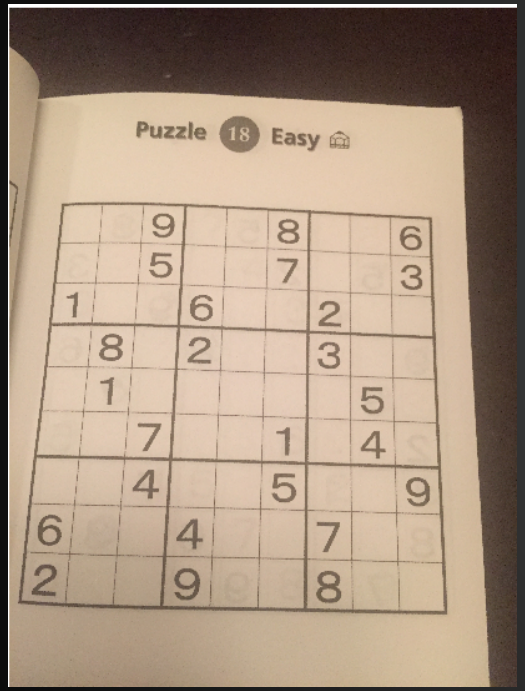
Processing Steps

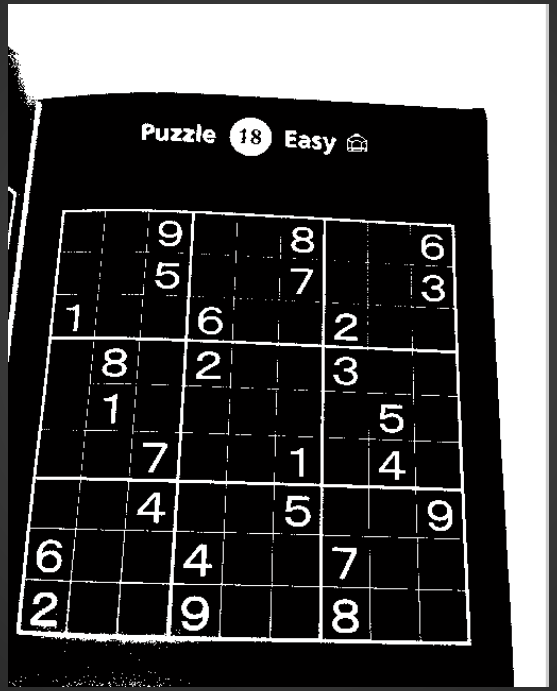
- Grid Detection
- OCR
- Solving the puzzle

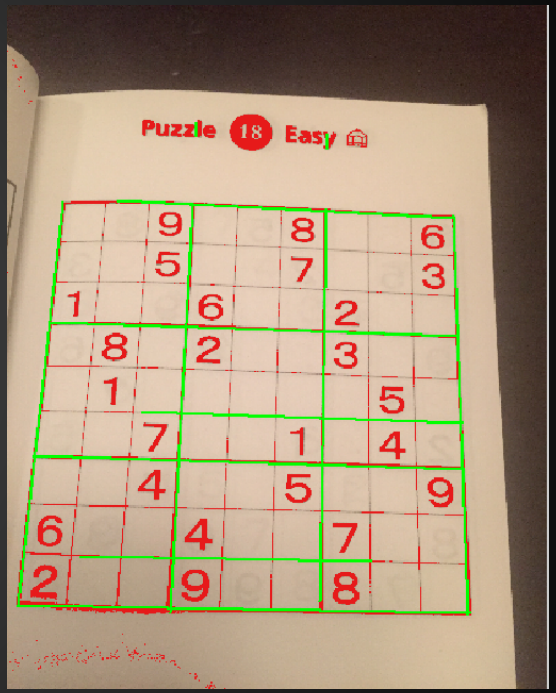
Grid Detection

- Gaussian blur to clean up noise
- Connected components
- Hough transform to find grid lines

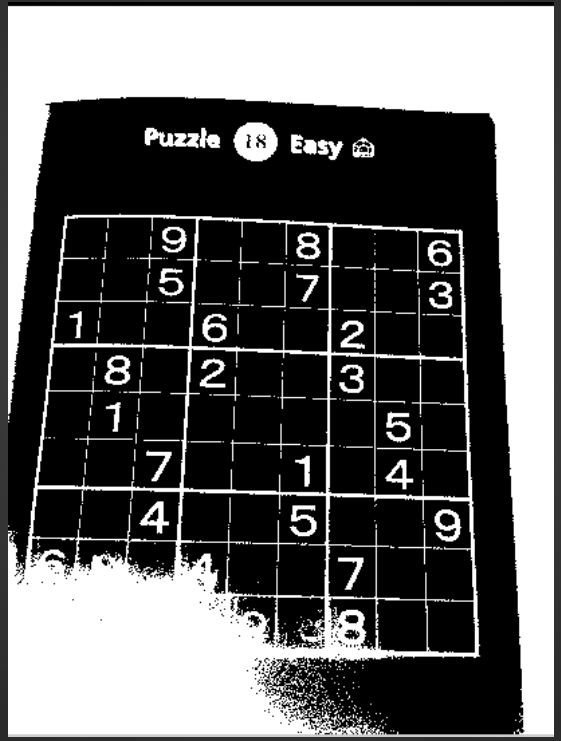
Grid Detection Images



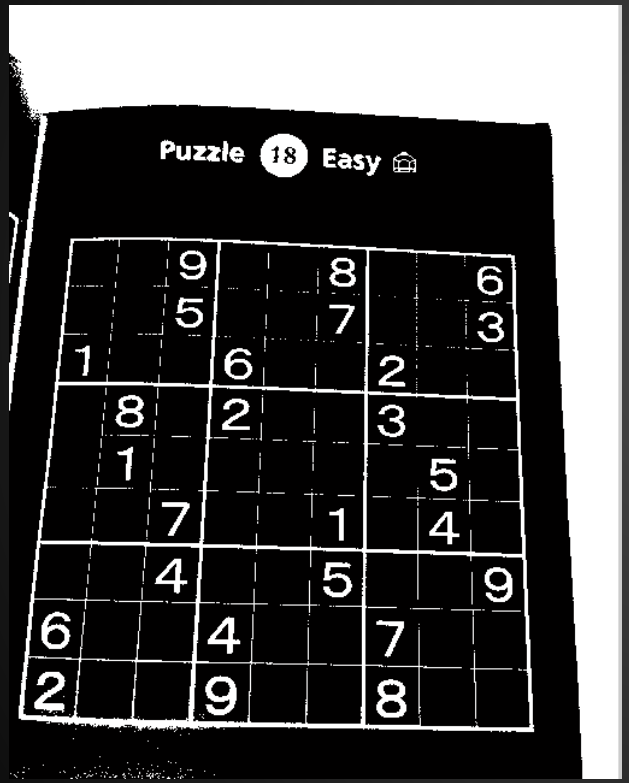


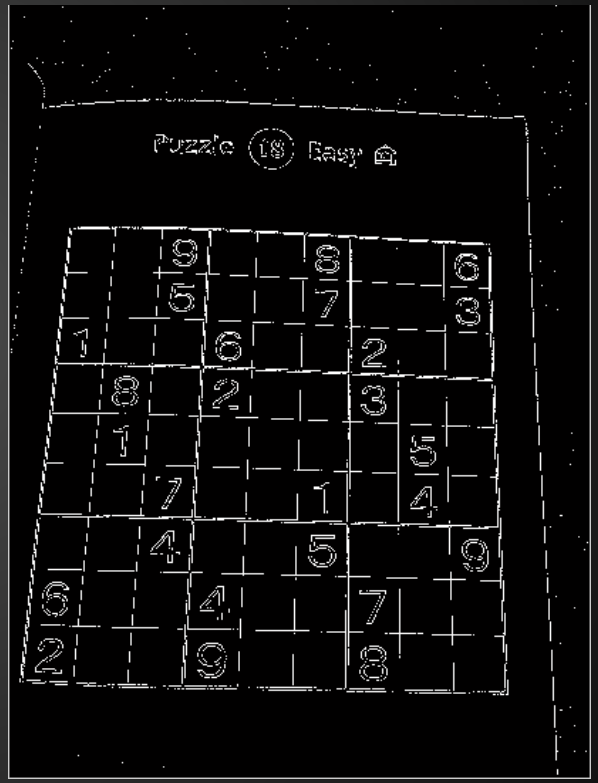


Disadvantage of Global Thresholding

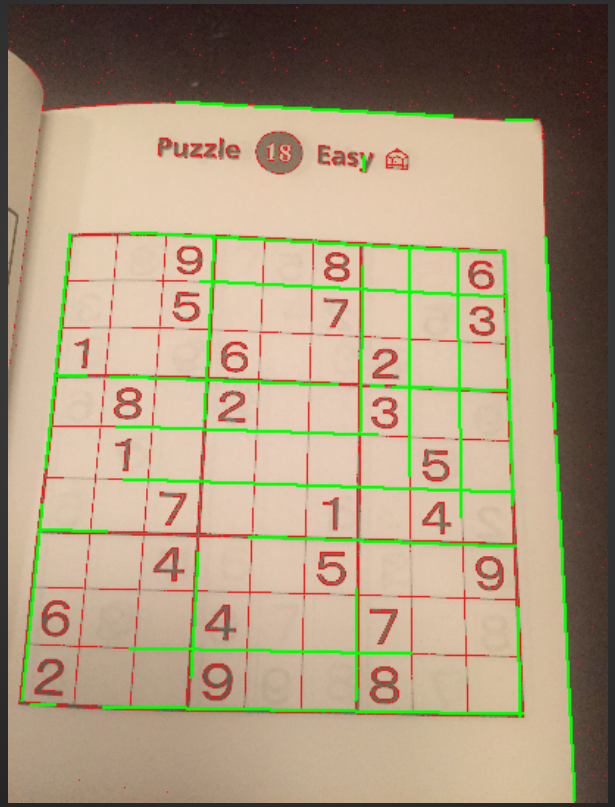


Adaptive Thresholding





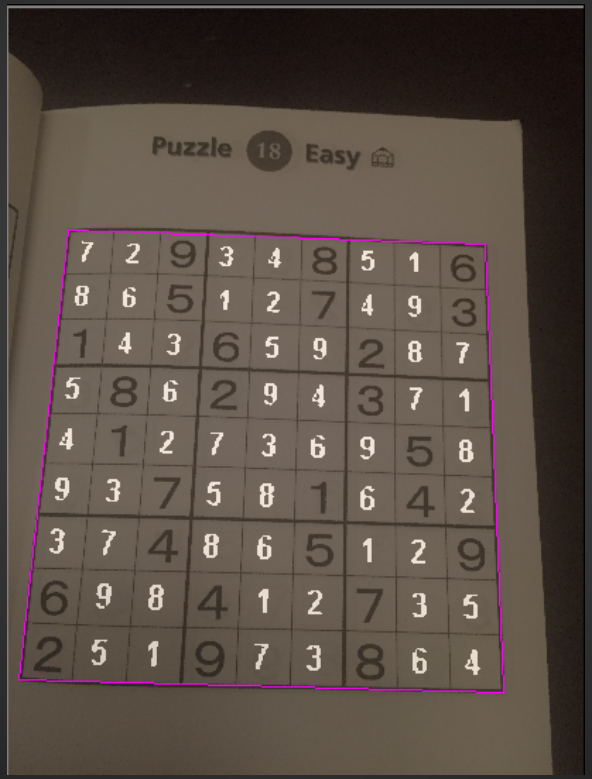
Adaptive Thresholding



OCR (optical character recognition)

- Pre-processing step
- Matrix matching
- Feature Extraction
- Post Processing

Solving the Puzzle



Next steps

Test images of the puzzle at set distances

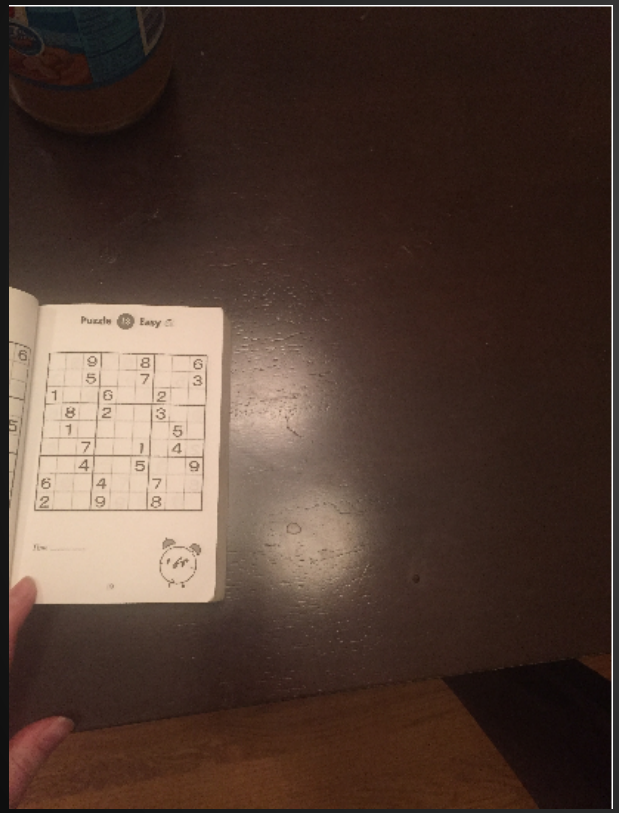
Test variable lighting images

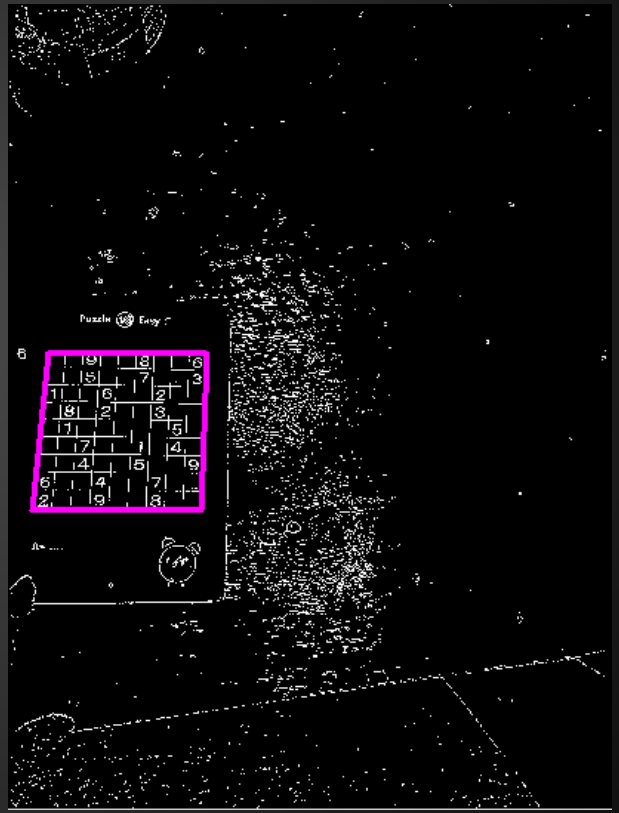
Results so far:

Grid detection works at a distance

OCR doesn’t work quite as well

Grid Detection at a Distance





References

[1] F. Zhao, Q. Huang, and W. Gao, “Image Matching by Normalized Cross-Correlation”Acoustics, IEEE Speech and Signal Processing, 2006. ICASSP 2006 Proceedings.

[2] Richard Szeliski, “Computer Vision: Algorithms and Applications”, Springer pg 321-335 2010.

[3] Simha P.J, SurajK.V, Ahobala T, “Recognition of Numbers and Position Using Image Processing for Solving Sudoku Puzzles”,