# AN INTERACTIVE TOOL FOR ROI EXTRACTION AND COMPRESSION ON WHOLE SLIDE IMAGES

Yuhang Dong, Hongda Shen, and W. David Pan

Dept. of Electrical & Computer Engineering, University of Alabama in Huntsville, Huntsville, Alabama 35899, USA.

Introduction

❑ Telemedicine technologies widely used, but limited by bandwidth when dealing with whole slide images.

❑ Solution: Extract Regions of Interest (ROI) and use lossless compression on, e.g., infected cells.

❑ GUI Tool: allows us to compare different compression algorithms on "continuous" variables.


WSI   ROI

http://peir-vm.path.uab.edu/debug.php?slide=IPLab11Malaria
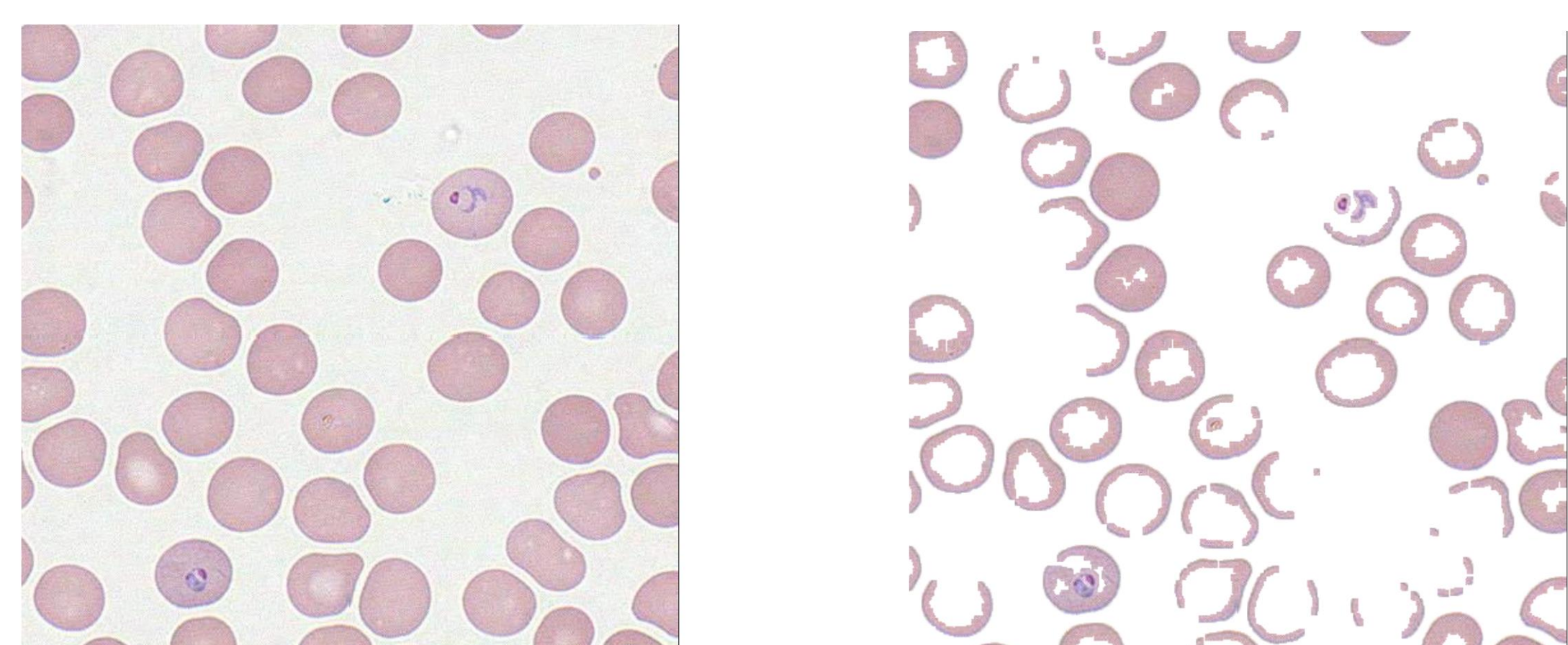
Graphic User Interface

❑ ROI: Malaria Parasite nuclei

❑ Method: Calculate MAD value between target block and source block, followed by thresholding.

❑ Heat map: Red = poor match; Blue = good match.

❑ Histogram: Most fall in 100 --120 (background) → high compression ratio.

❑ Bzip2 & Zip: Map to 1D vector before compression

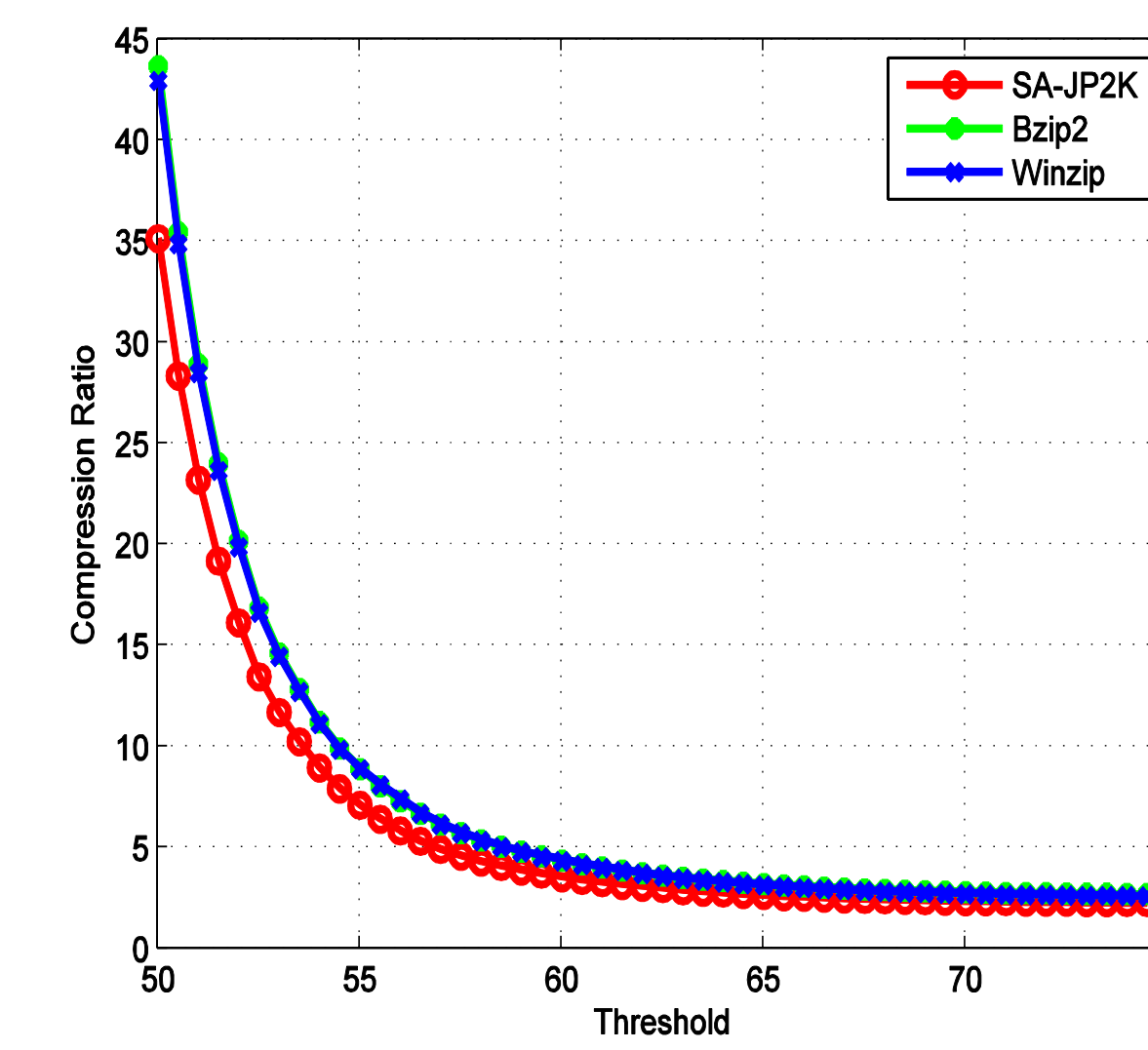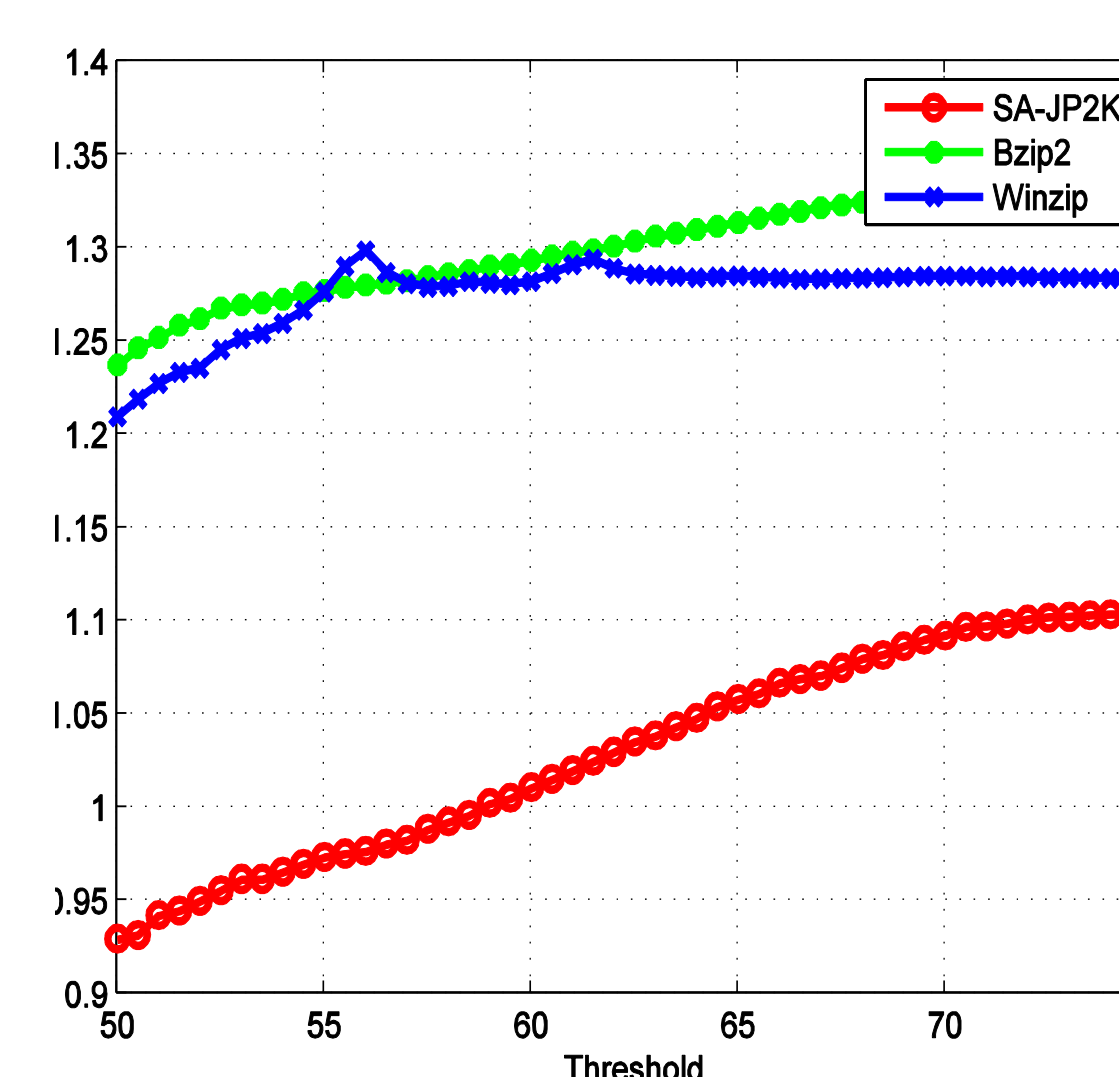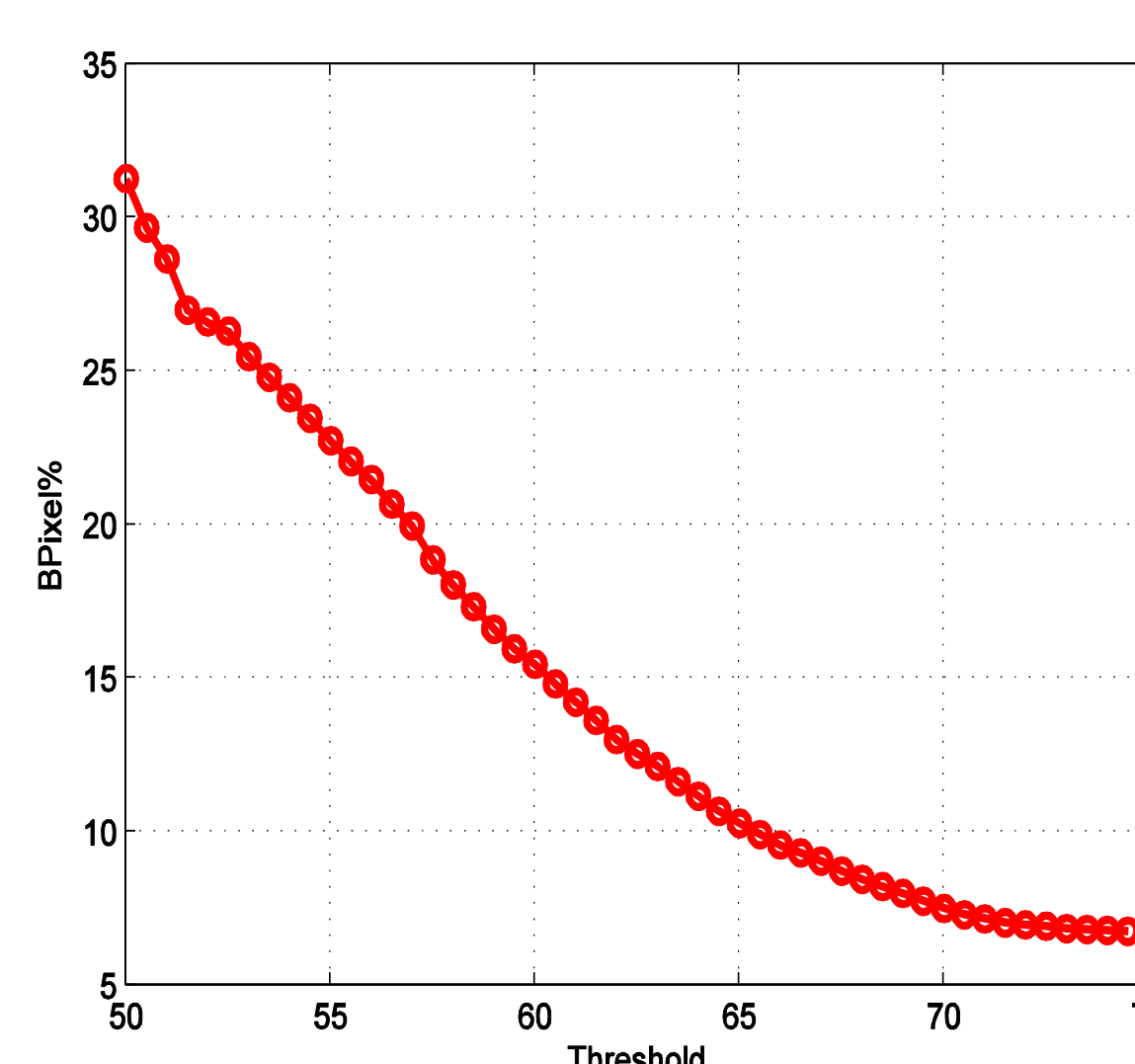❑ Shape Adaptive JPEG 2000 (SA-JP2K): Compress irregular shape ROIs.
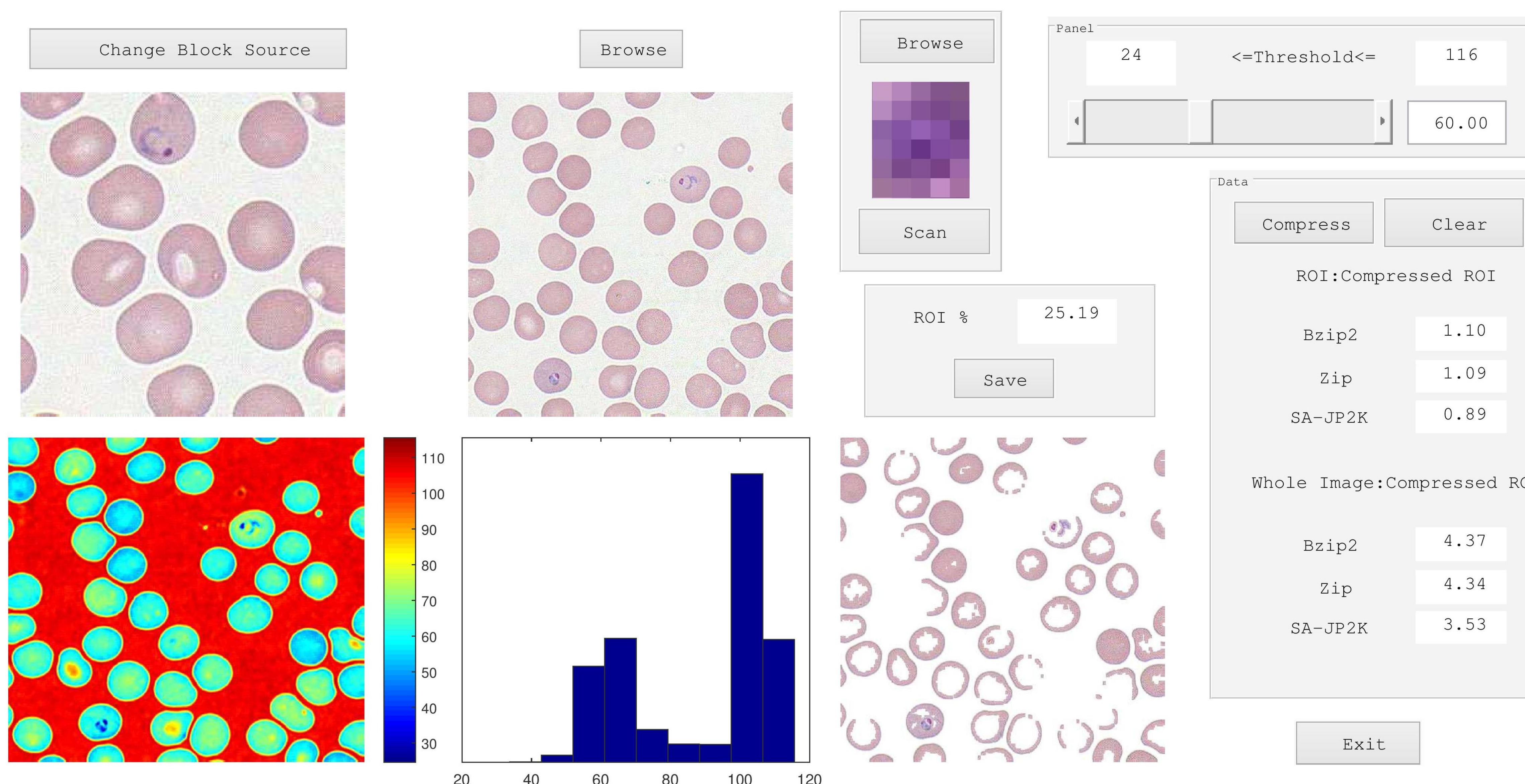
ROI Extraction
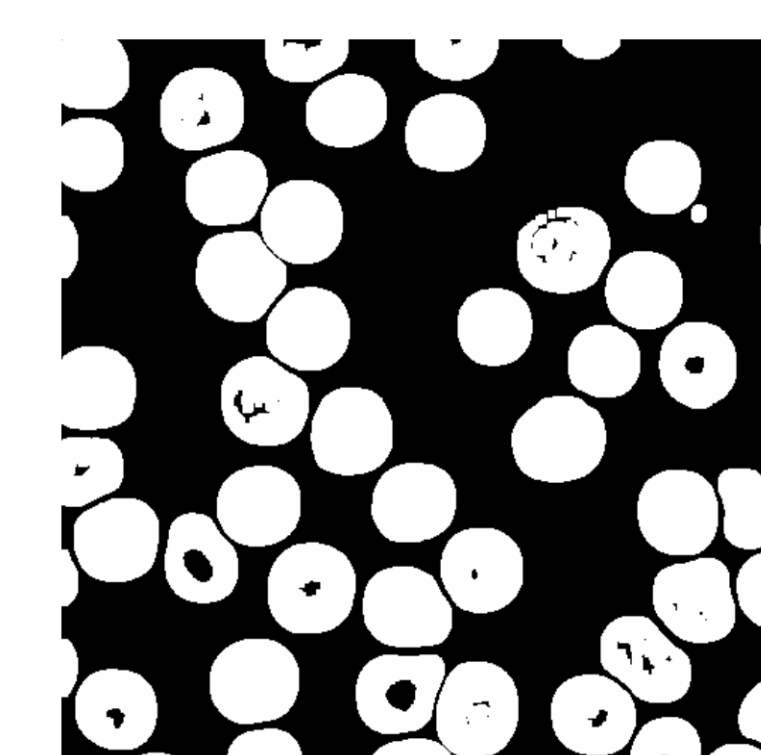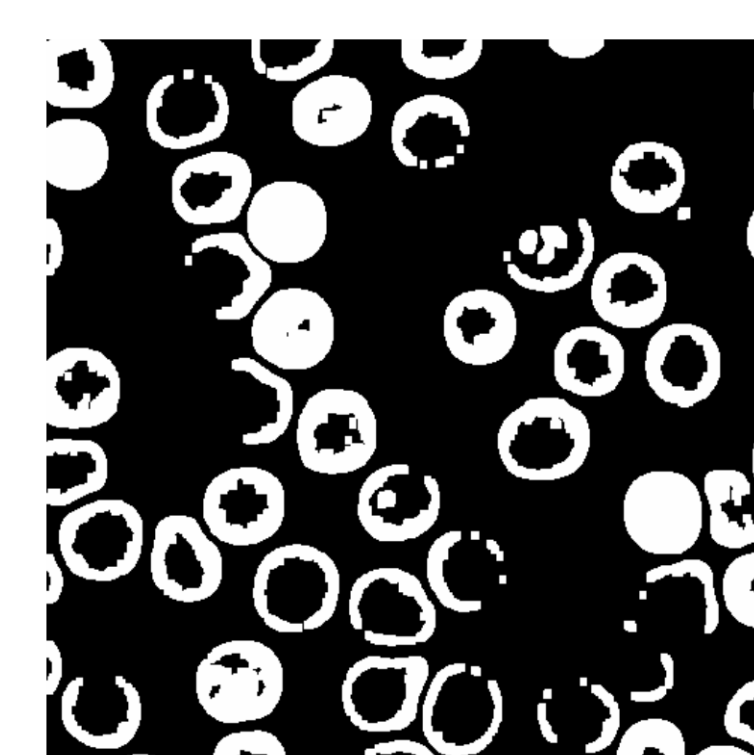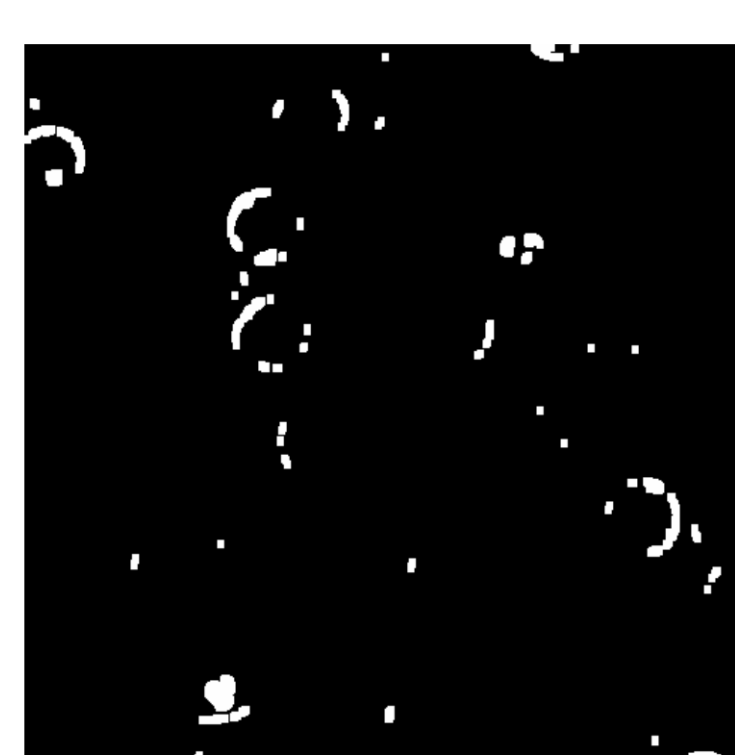
Thresholds: 50, 60, 70
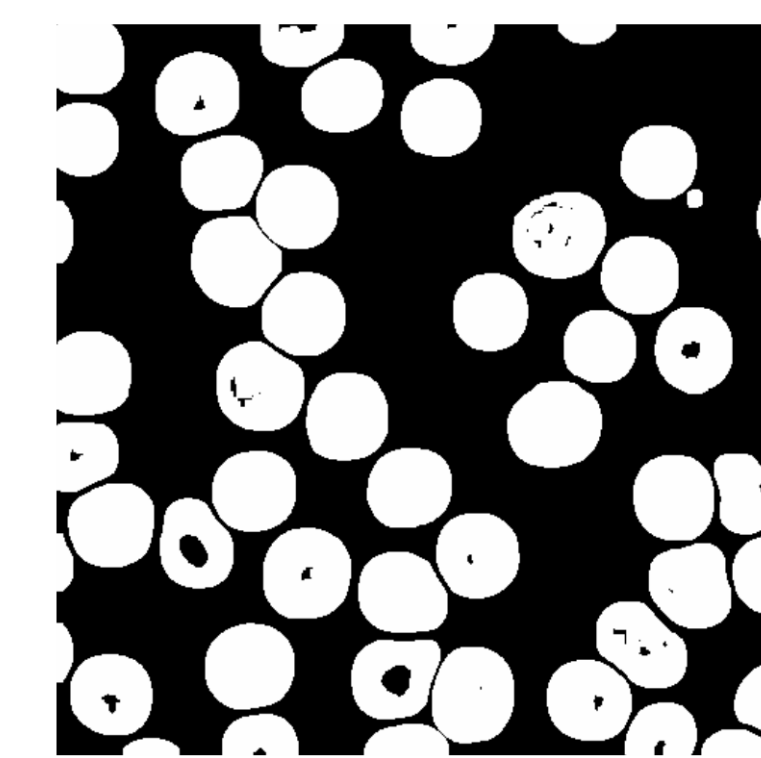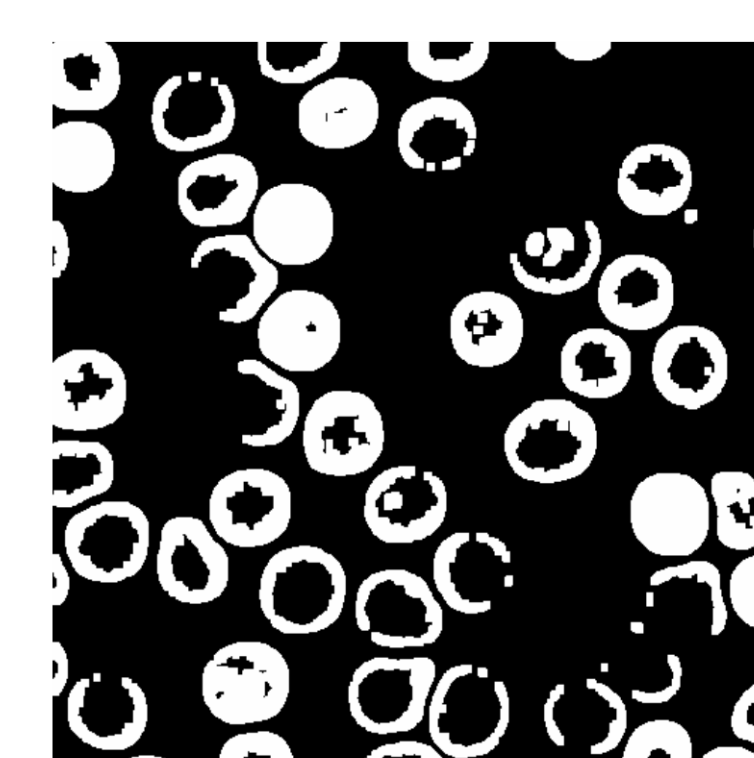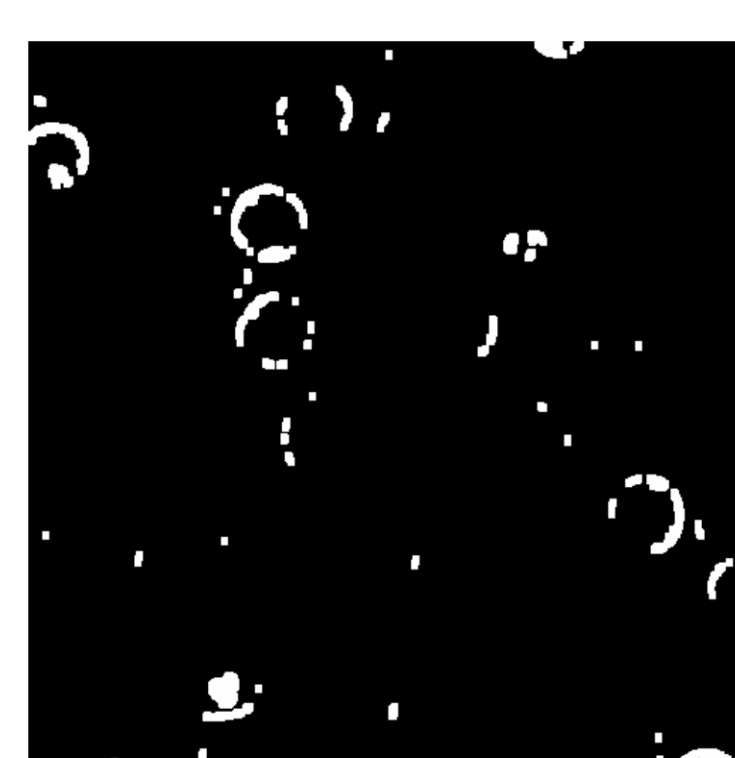
Thresholds: 50.5, 60.5, 70.5

Compression

❑ BPixel% = # of boundary pixels / # of ROI pixels. When threshold increases, ROI shape gets regular, the percentage of boundary pixels decreases.

❑ Irregular shape → high-value coefficients for the discrete wavelet transforms in SA-JP2K → more bits to code → lower compression.

❑ Compression Ratios: As high as 40, at least 5 → much higher than direct compression.

Conclusions and Future Work

❑ GUI can be extended to support other methods such as machine learning.

❑ Provide new insights into performances of different compression methods.

❑ The appearance of GUI can be improved and more complex algorithms will be embedded.

Major Reference:
S. Li and W. Li, "Shape adaptive discrete wavelet transforms for arbitrarily shaped visual object coding," *IEEE Trans. Circuits Syst. Video Technol.*, vol. 10, no. 5, pp. 725–743, Aug. 2000.