Image Processing for Cellular Metrology

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Core Issue

- Imaging technologies are increasingly being used both as diagnostic tools and as research tools in the biosciences

- Image segmentation is an important first step

- Our goal is to evaluate how well commonly used segmentation algorithms compare to each other

- Failure to segment accurately can lead to incorrect conclusions from cell-image data

Approach

- Two cell lines – A10 & 3T3
- Different image exposure and filter levels
- No image preprocessing
- Multiple sampling to assess random instrument noise
- Ground truth: expert manual segmentation
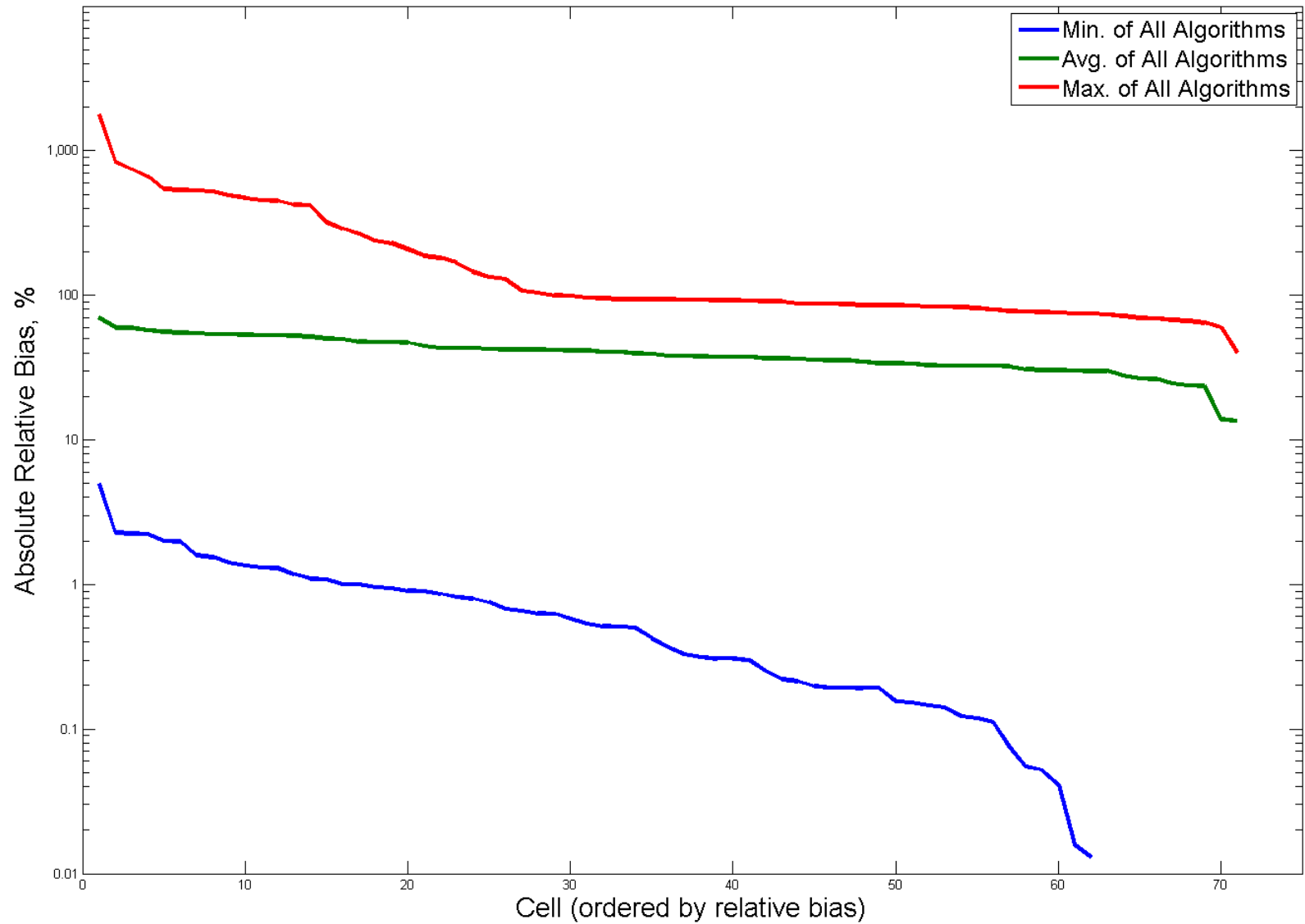- Approximately 8000 images – selected a subset of 80 representative images to use for initial evaluation work

Results

Cell Spread Area Mean Relative Absolute Bias by Algorithm
Across All Image Acquistion Parameters
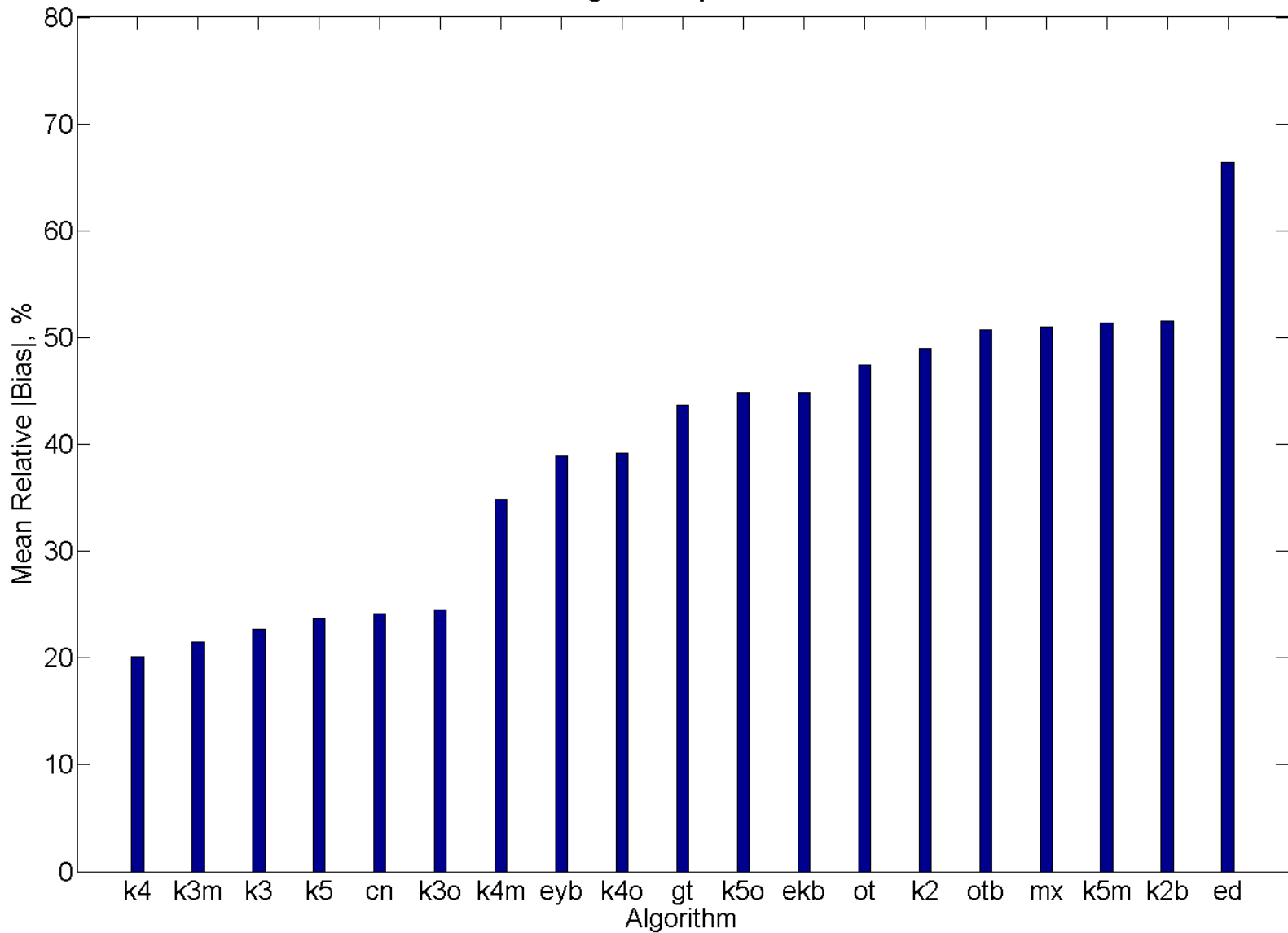
Results

Absolute Relative Bias for Cell Segmentation
Across all Image Acquistion Parameters

Conclusions

- It is difficult to accurately and robustly segment cell images under typical imaging conditions

- Biological researchers should consider using multiple techniques in parallel and then compare the results to identify bad segmentation

Contact Information

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