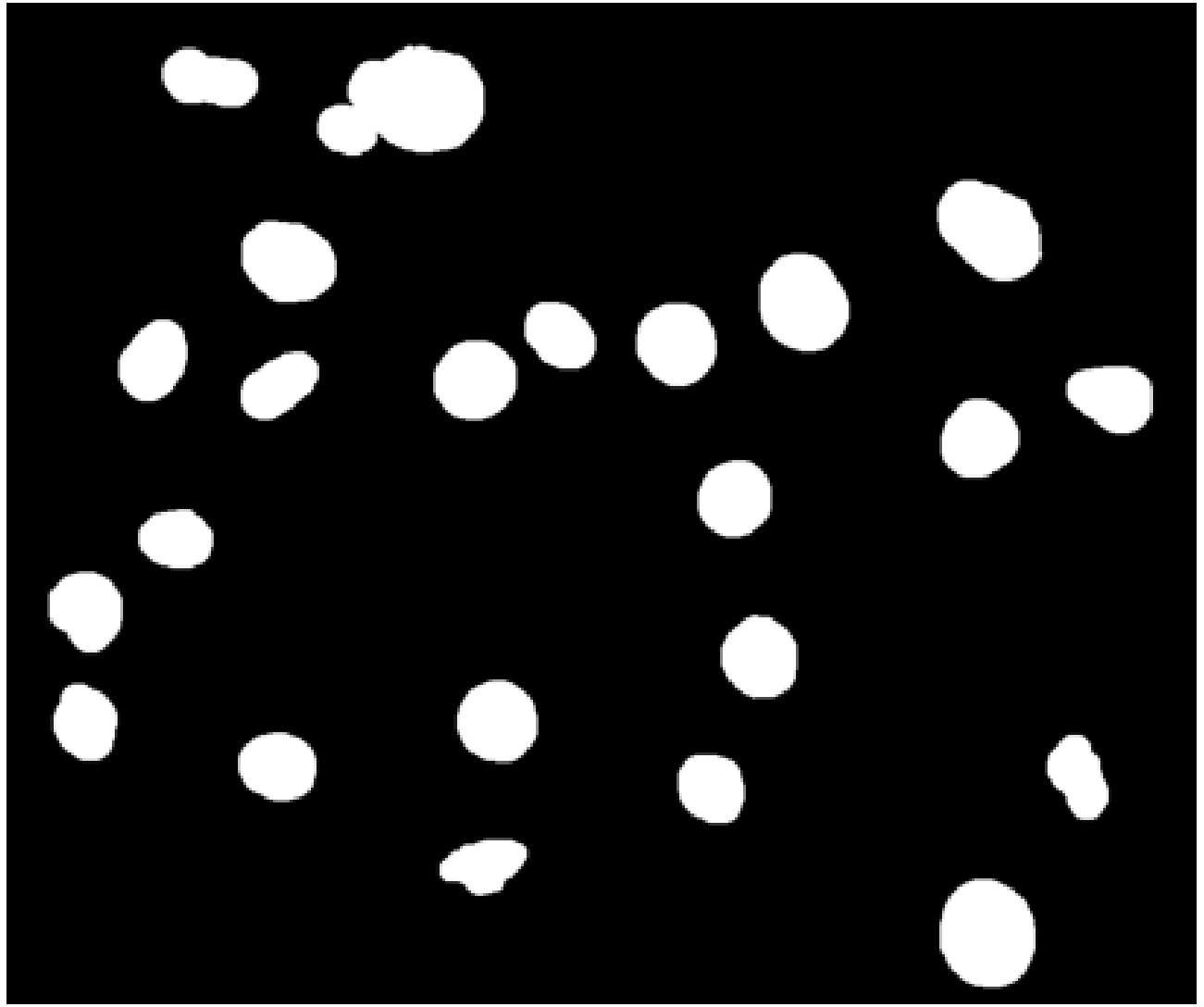
Project presentation

Implementation and evaluation of region growing

Data Analysis MoBi SS2021



Topic 04: Biomedical image analysis

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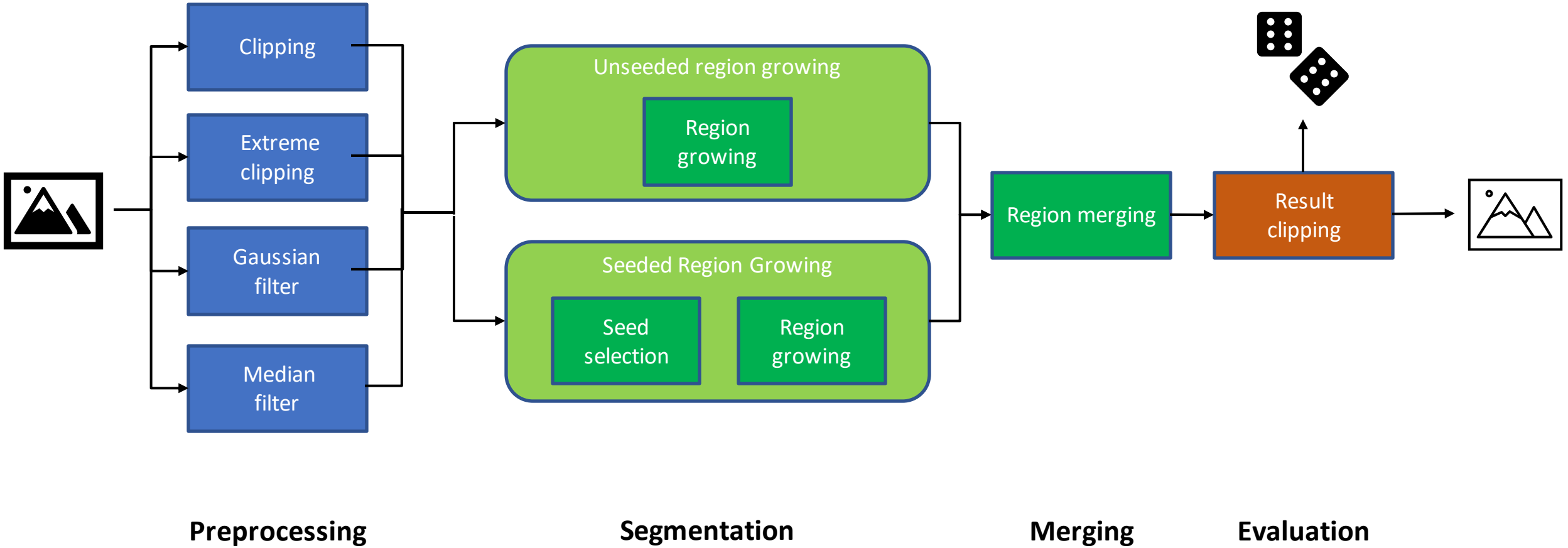
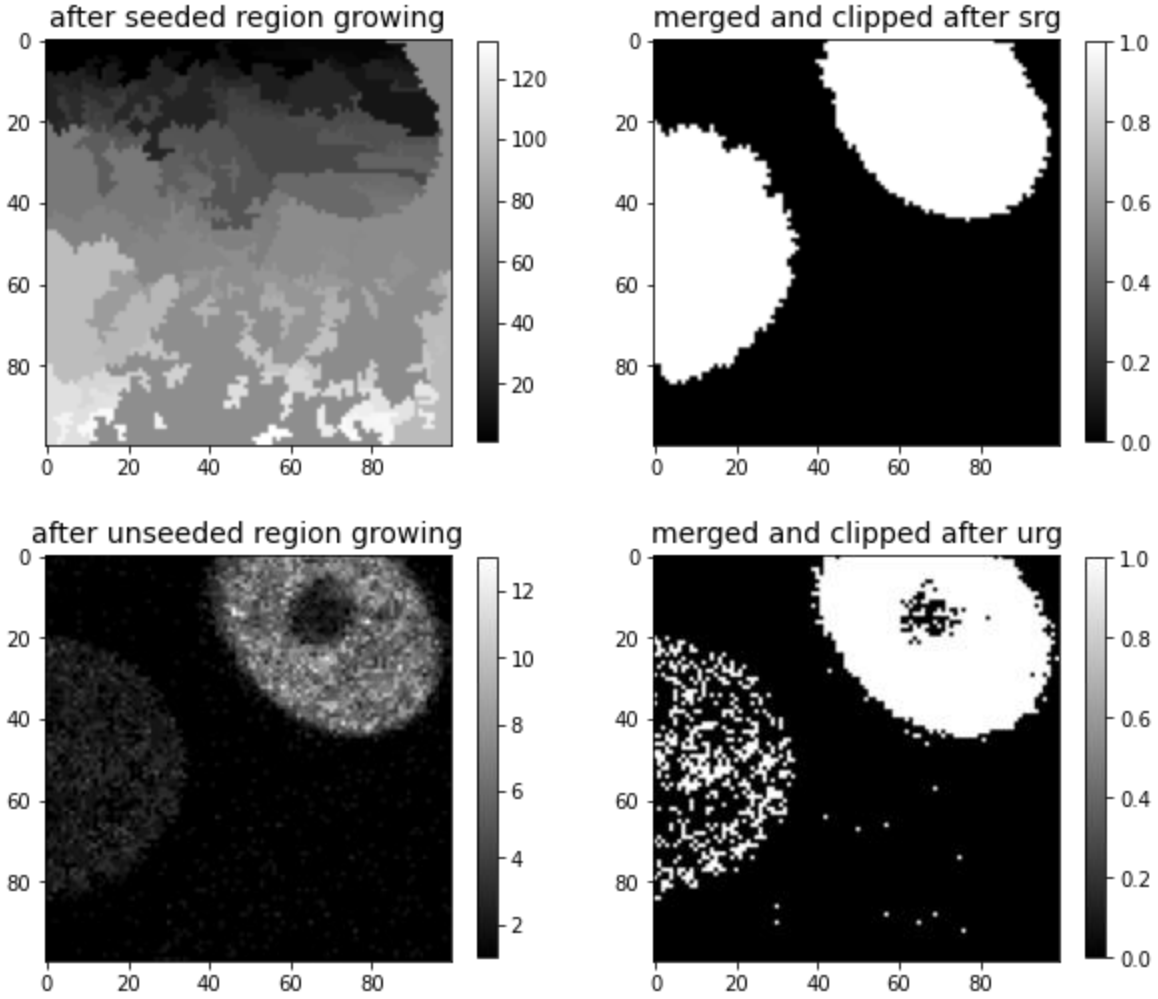
Group 04: Marie Becker, Ina Jung,
Laura Kaschnitz, Johanna Möller

21st July 2021

Algorithm overview



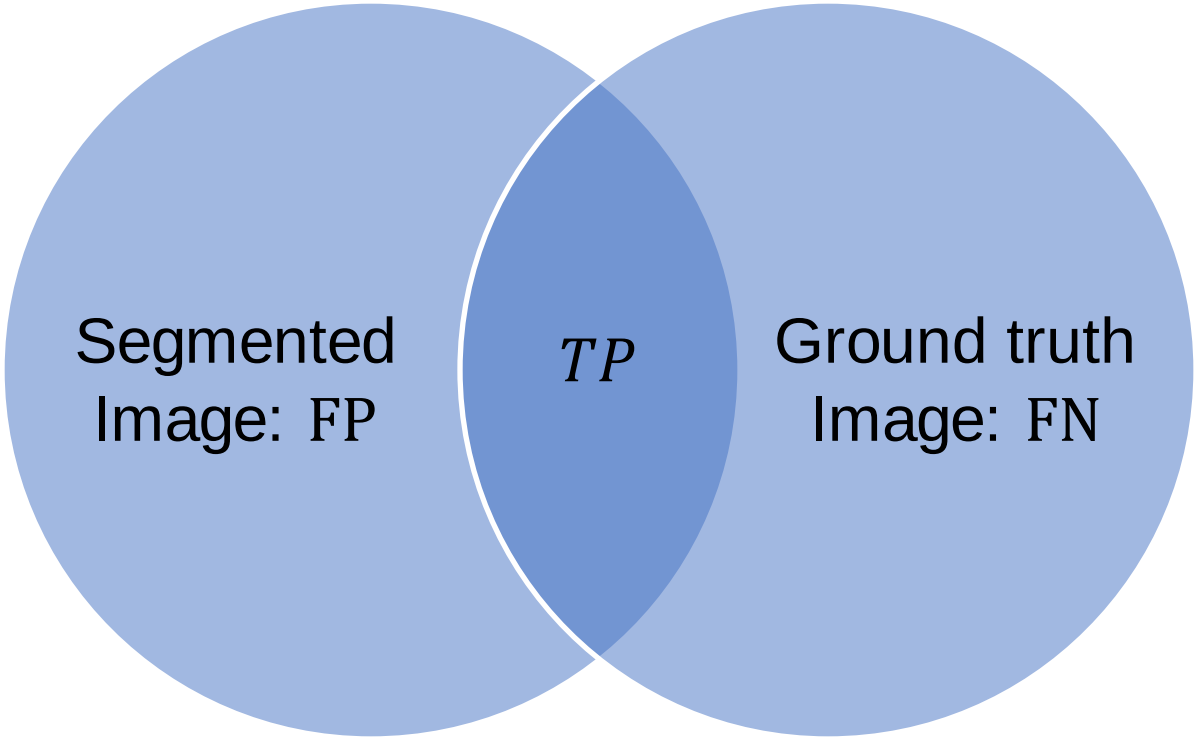
Comparison of algorithms



Differences between seeded and unseeded region growing:

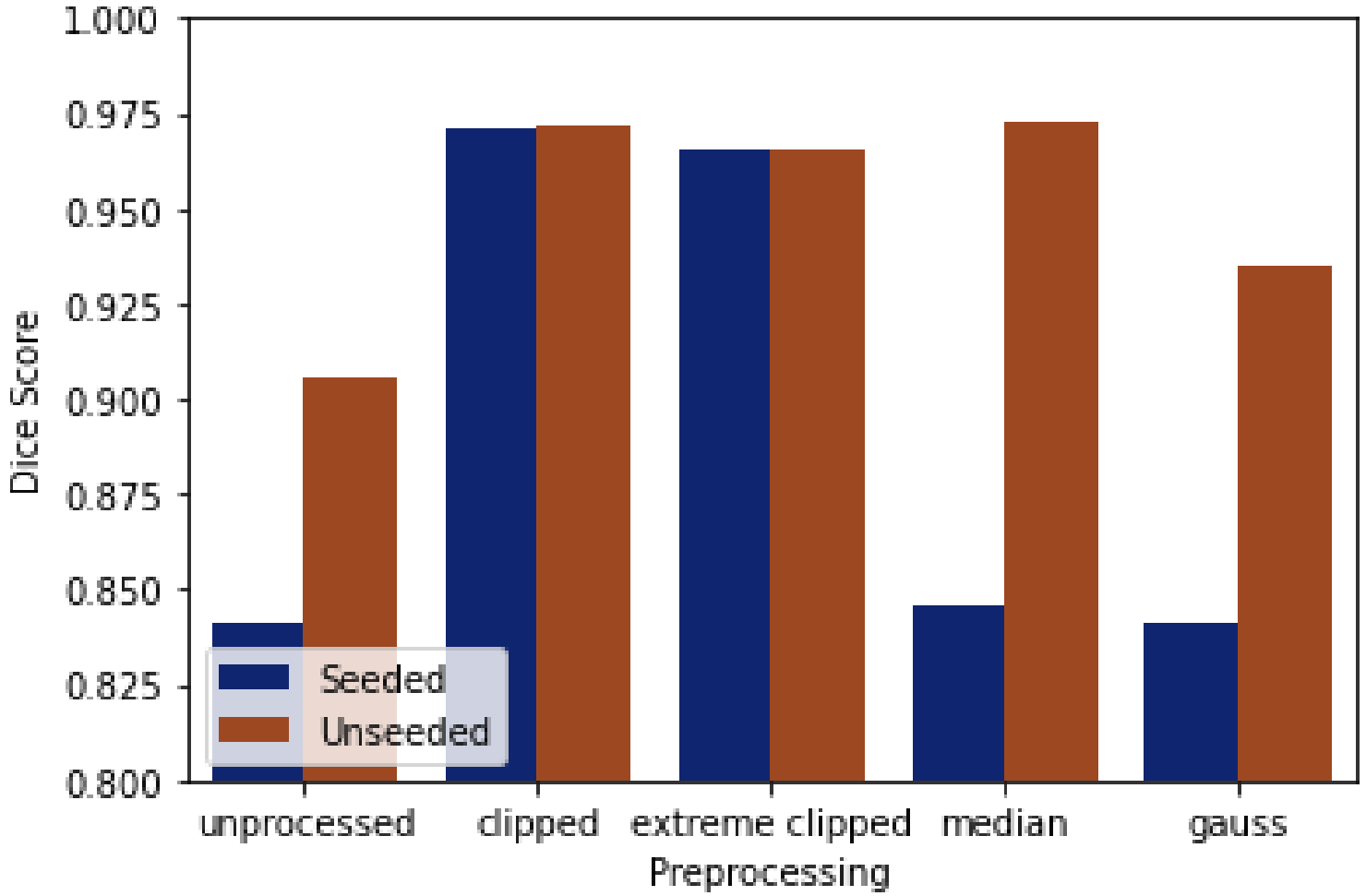
- Number of regions
- Dependency of seeds
- Assignment of pixels
- Intensity distance

Dice score



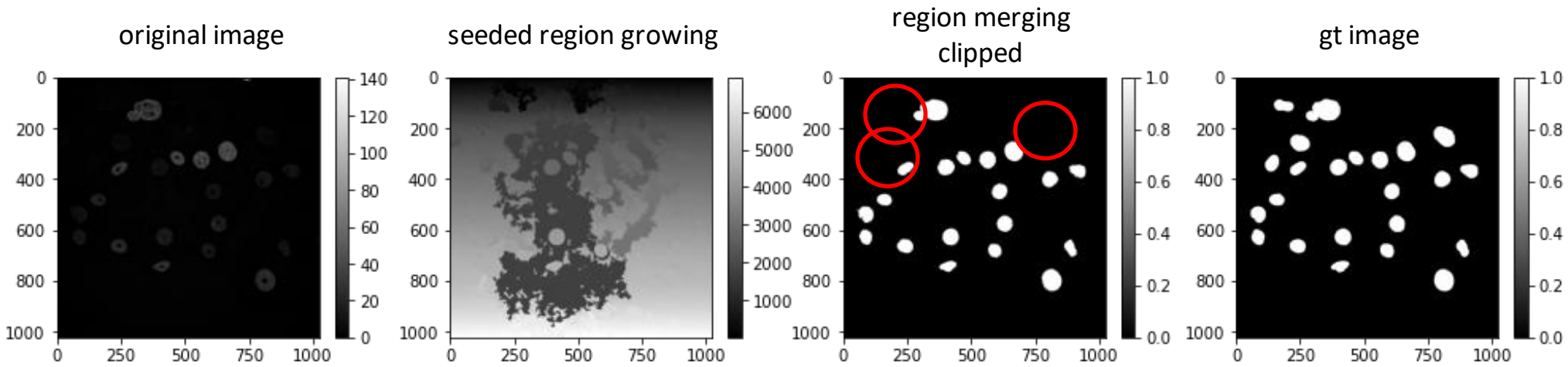
$$DSC = \frac{2TP}{2TP + FP + FN}$$

Evaluation of preprocessing



Results N2DH-GOWT1

Seeded region growing algorithm



Results N2DH-GOWT1

Seeded region growing algorithm

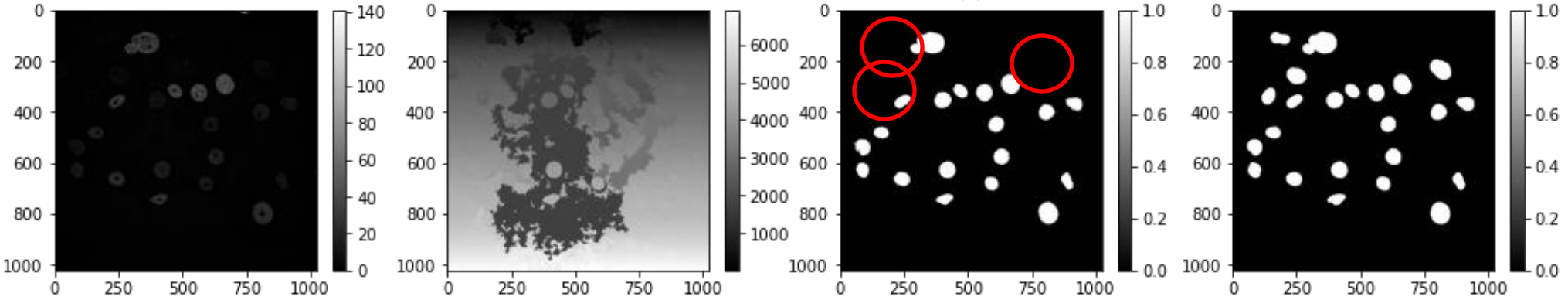
Unseeded region growing algorithm

original image

seeded region growing

region merging clipped

gt image

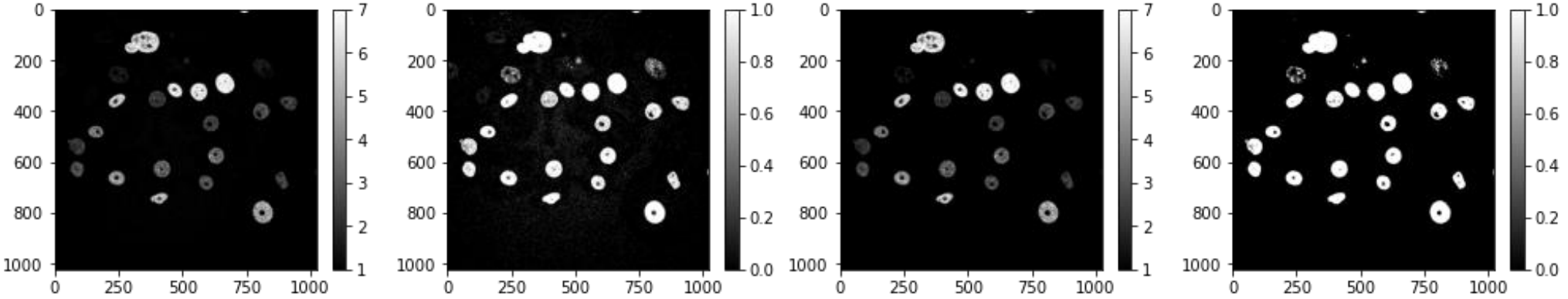


region merging

region merging clipped

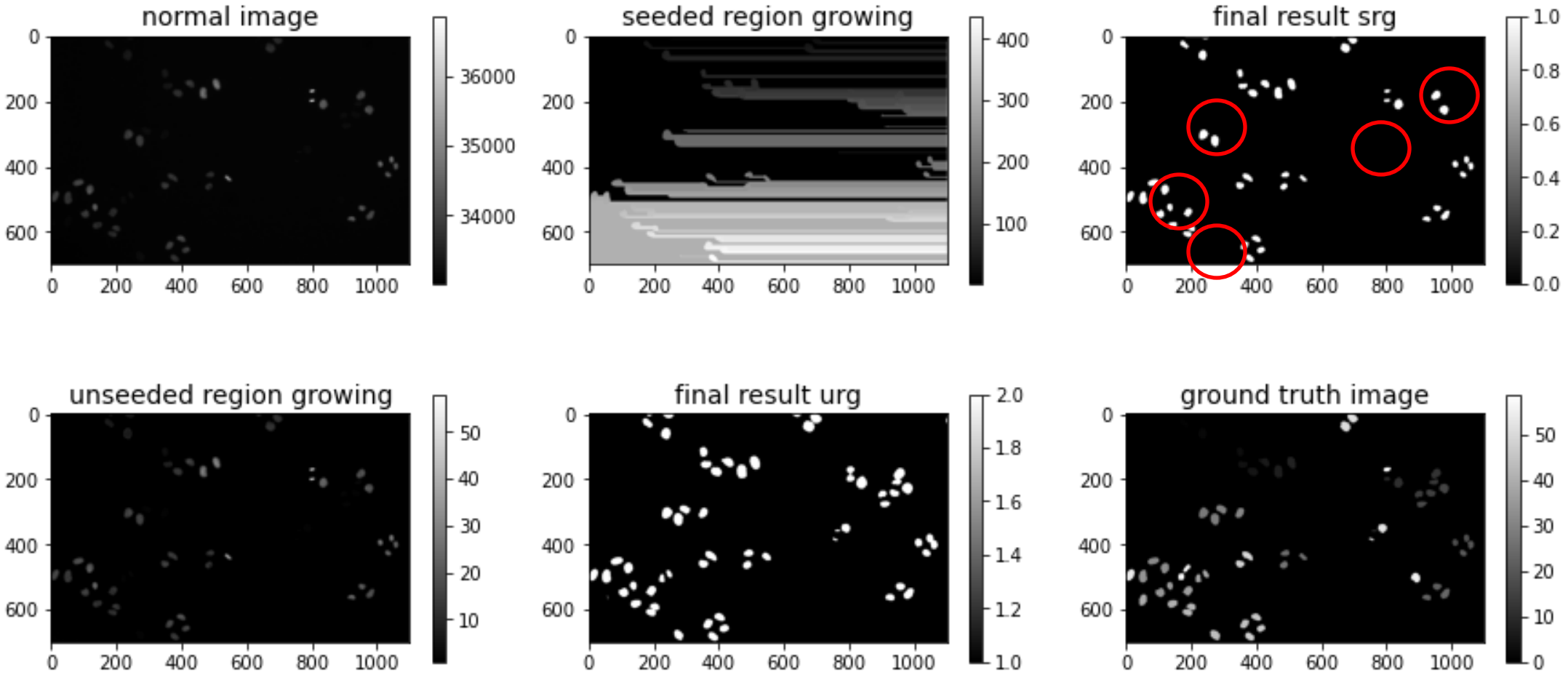
region merging filtered

region merging filtered and clipped

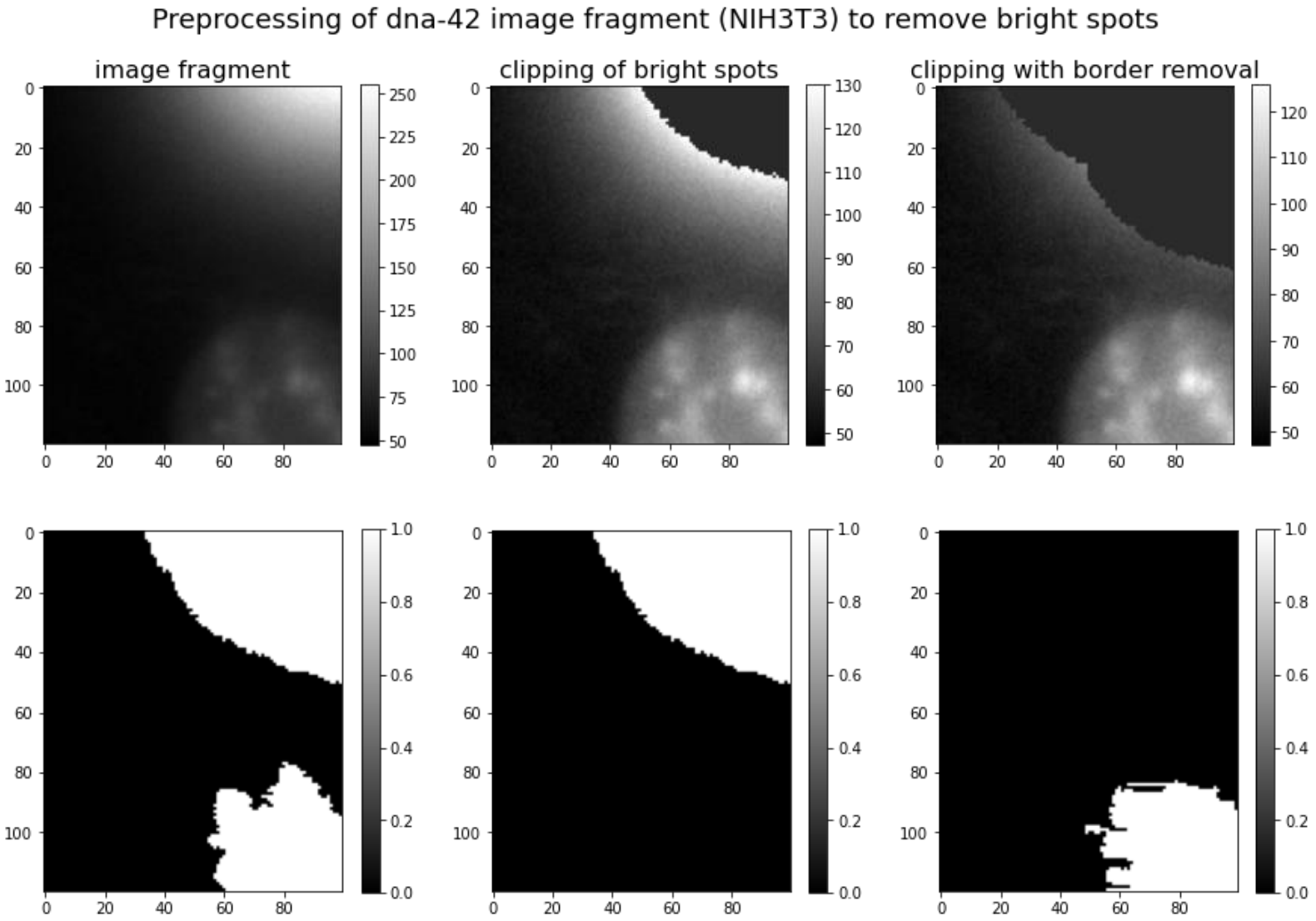


Results N2DL-HeLa

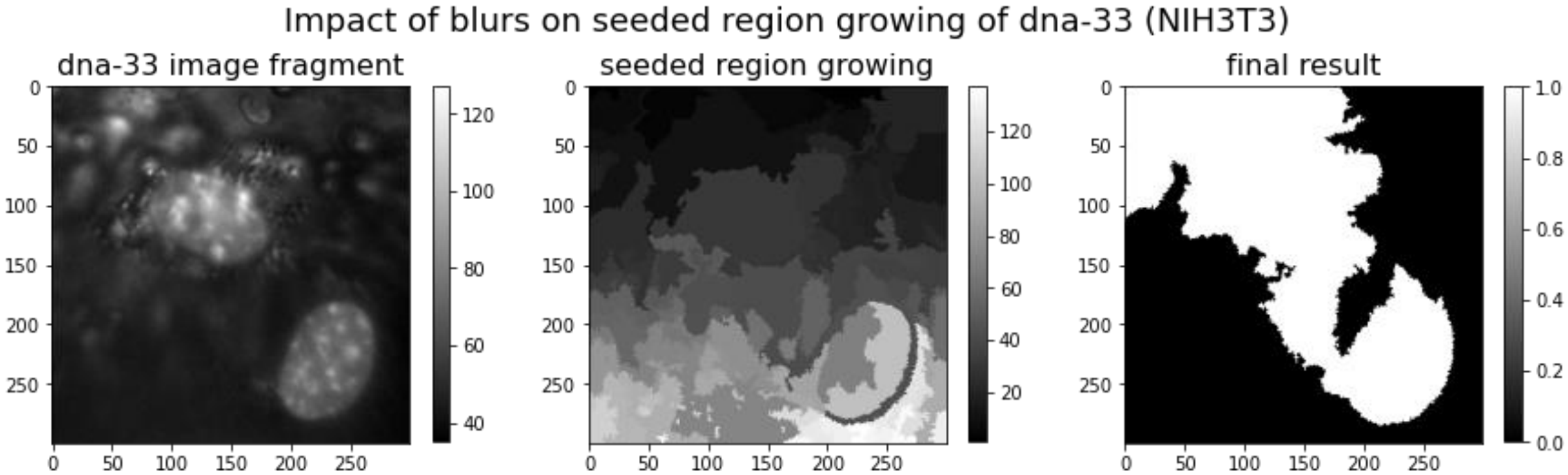
Results of seeded and unseeded region growing on image t13 of N2DL-Hela



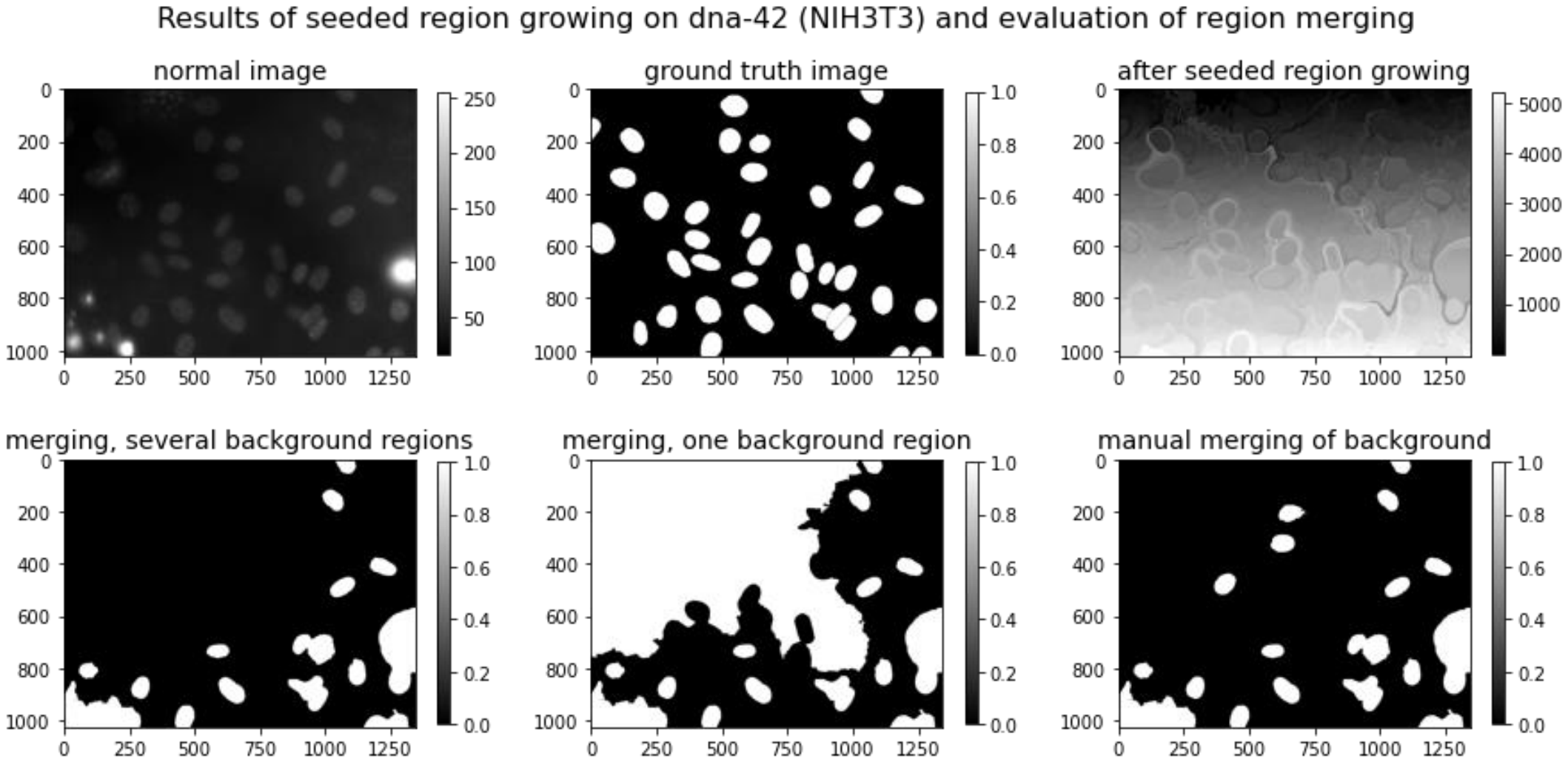
Bright spots in NIH3T3 data set



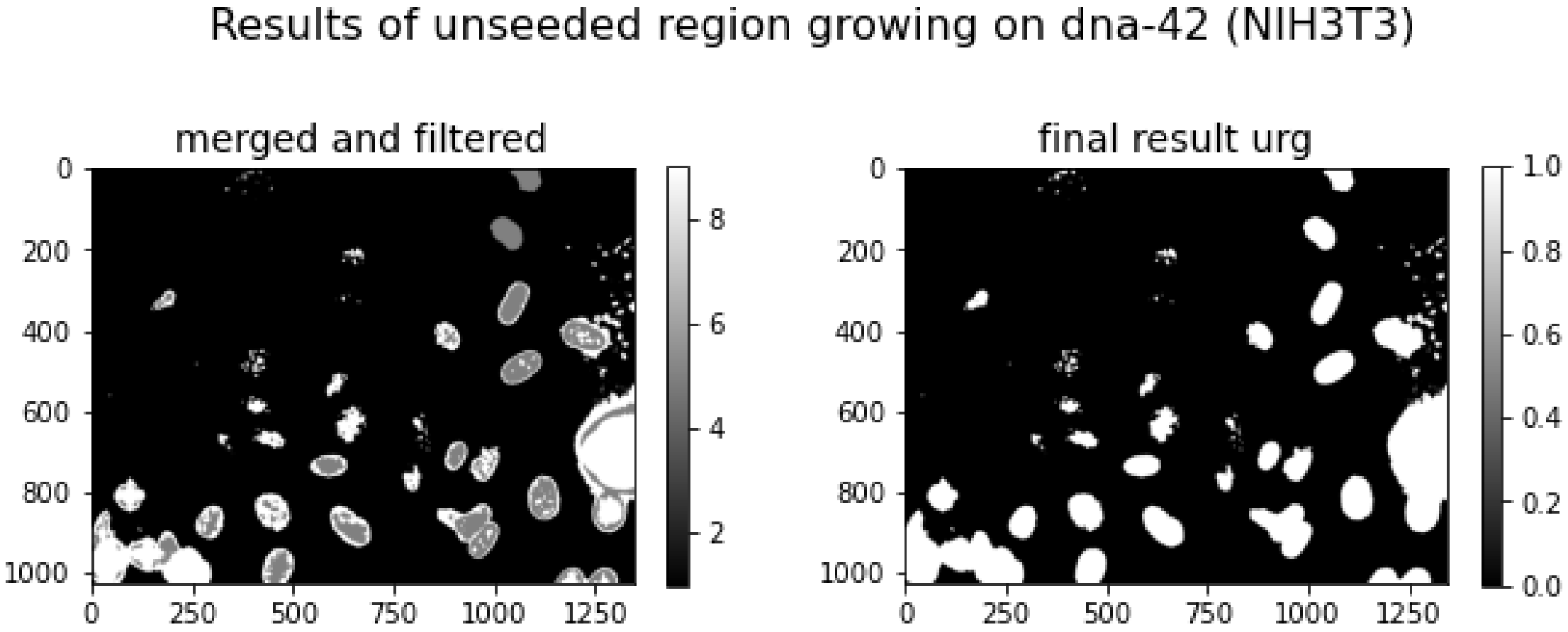
Blurs and changing background intensities



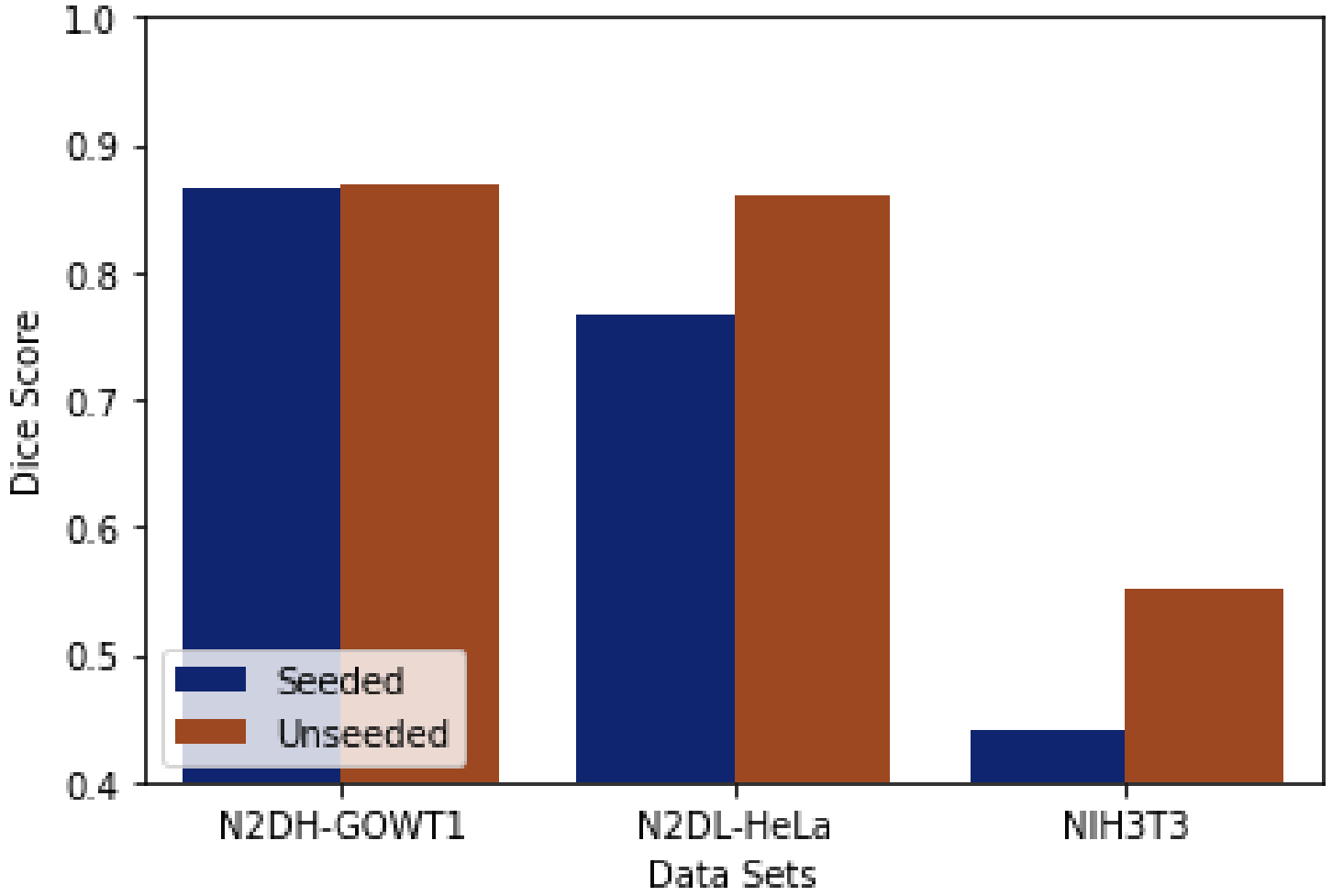
Results seeded region growing NIH3T3



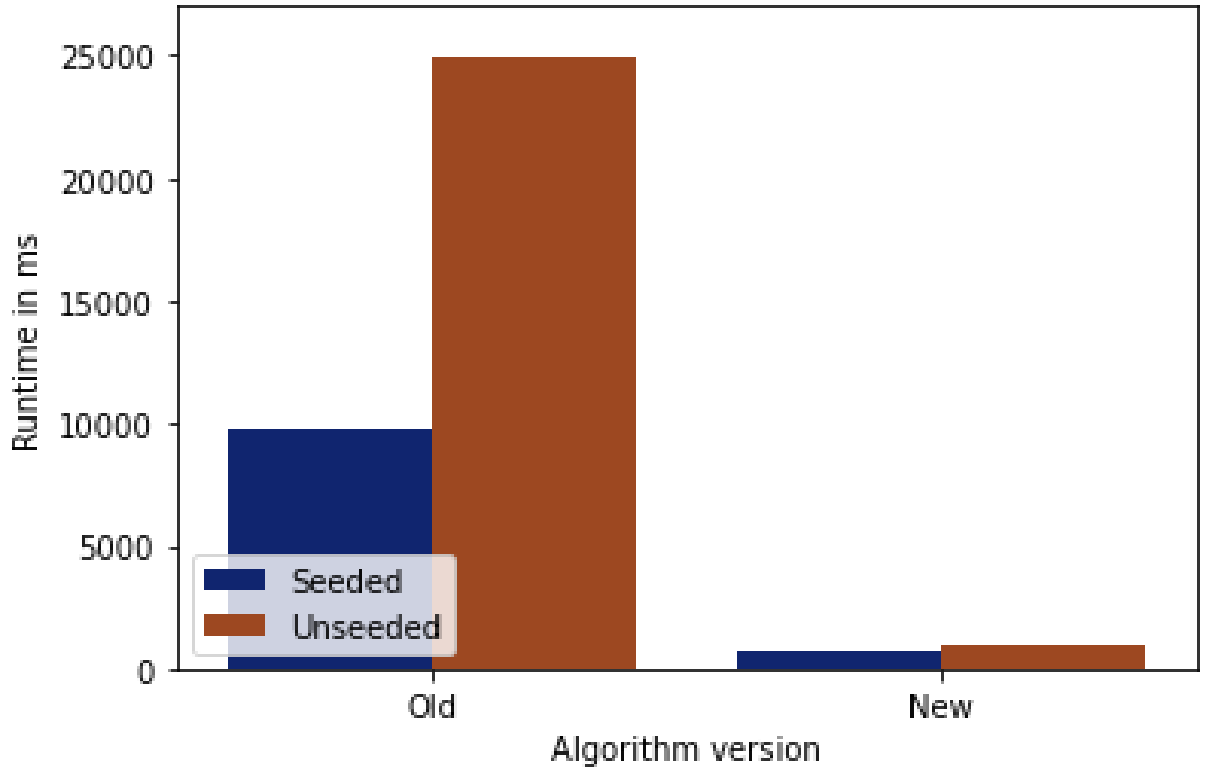
Results unseeded region growing NIH3T3



Seeded vs. Unseeded region growing results



Runtime Errors and Memory Errors



Runtime [ms]	Seeded	Unseeded
Old	9790	24900
New	678	933

"Unable to allocate 33.0 GiB for an array with shape (66518, 66518) and data type float64"

Discussion

High Dice scores N2DH-GOWT1 data set
High Dice scores N2DL-HeLa data set using pre-processing
Unseeded region growing more accurate on difficult images
Dice score to evaluate results

Lower dice scores on difficult images of the NIH3T3 data set
Image challenges were only solved on small images
Runtime still too long

Assign more than one pixel at a time
Determine parameters automatically