Unsupervised Segmentation and Labeling based on Multiple Cell Images

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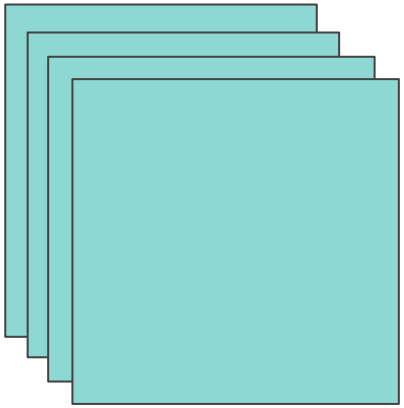
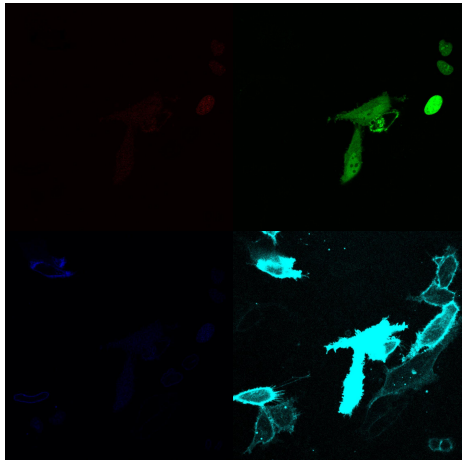
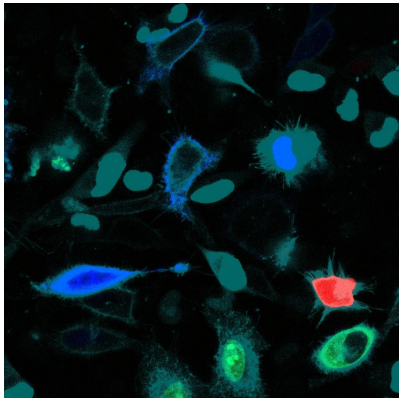
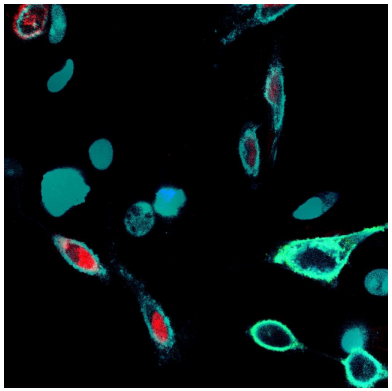
Image preprocess









Original Experiment Data
4 Groups

R G B Cyan Channels
480 Channels

Reconstruction
120 Pics

Enhancement
120 Pics

Tune Parameters to make each cell to be seen clearly

1) Histogram Adjustment

2) Gussian Fusion

Segmentation

Cellpose Segmentation

Deep Learning + **Watershed segmentation**

→ handle more complex objects

→ deal with overlapping problem better

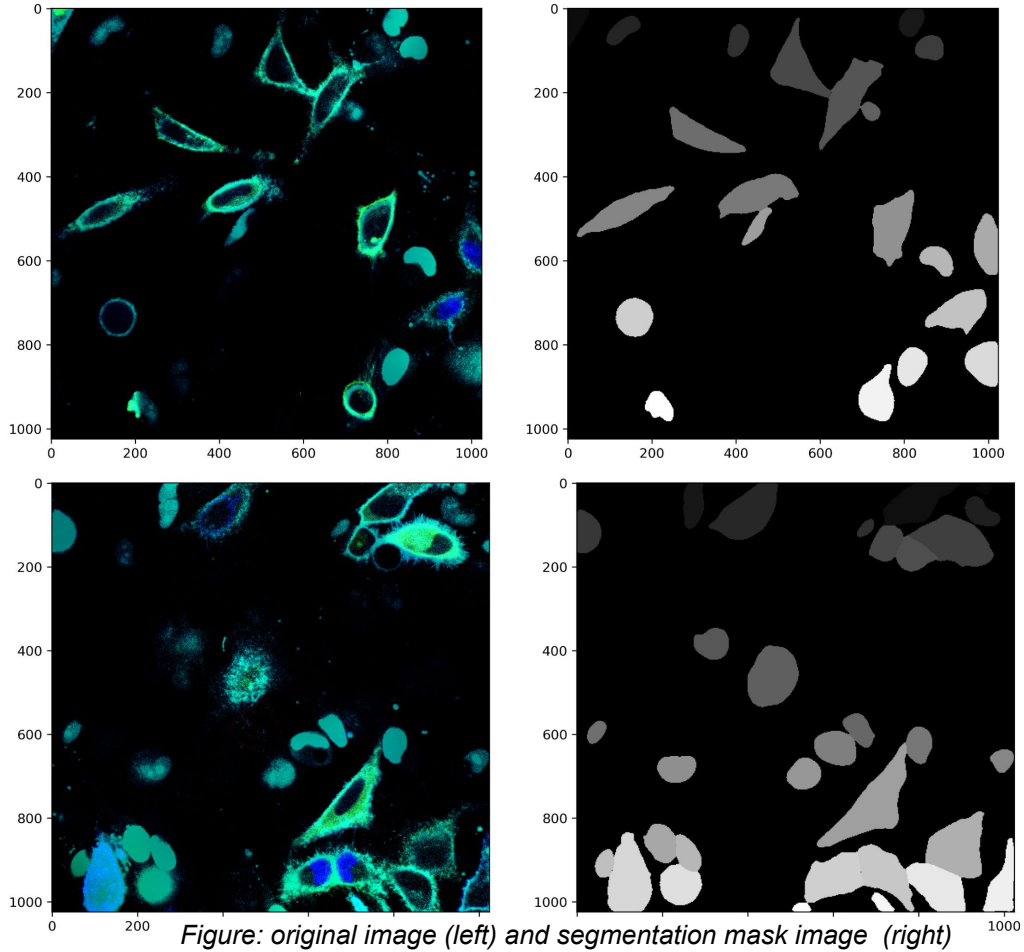
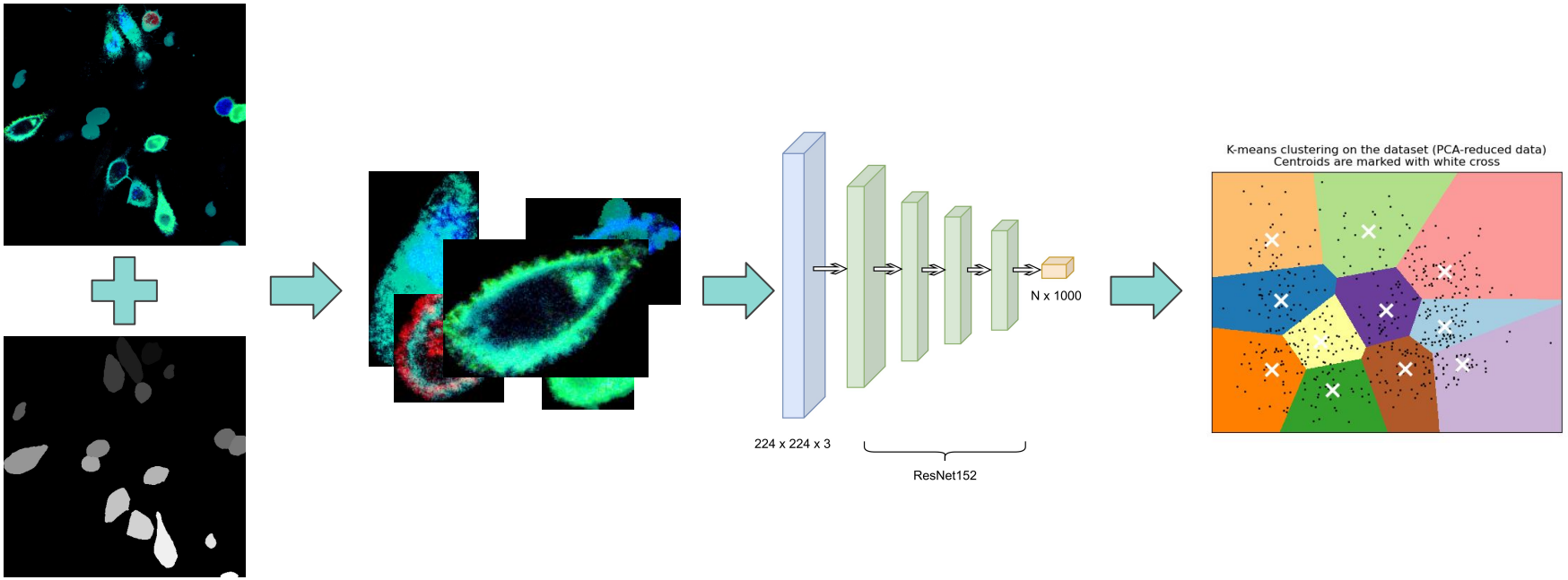
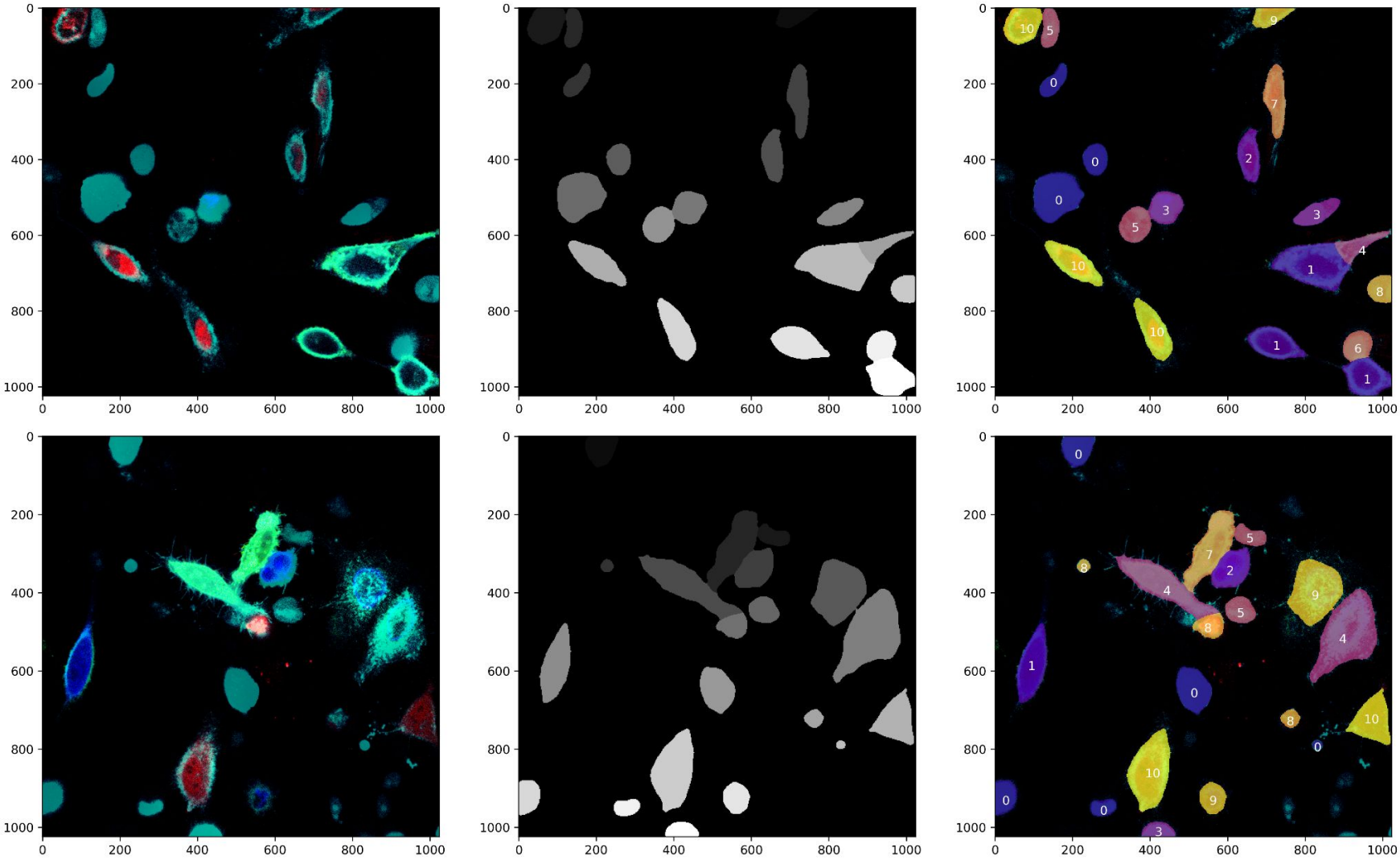


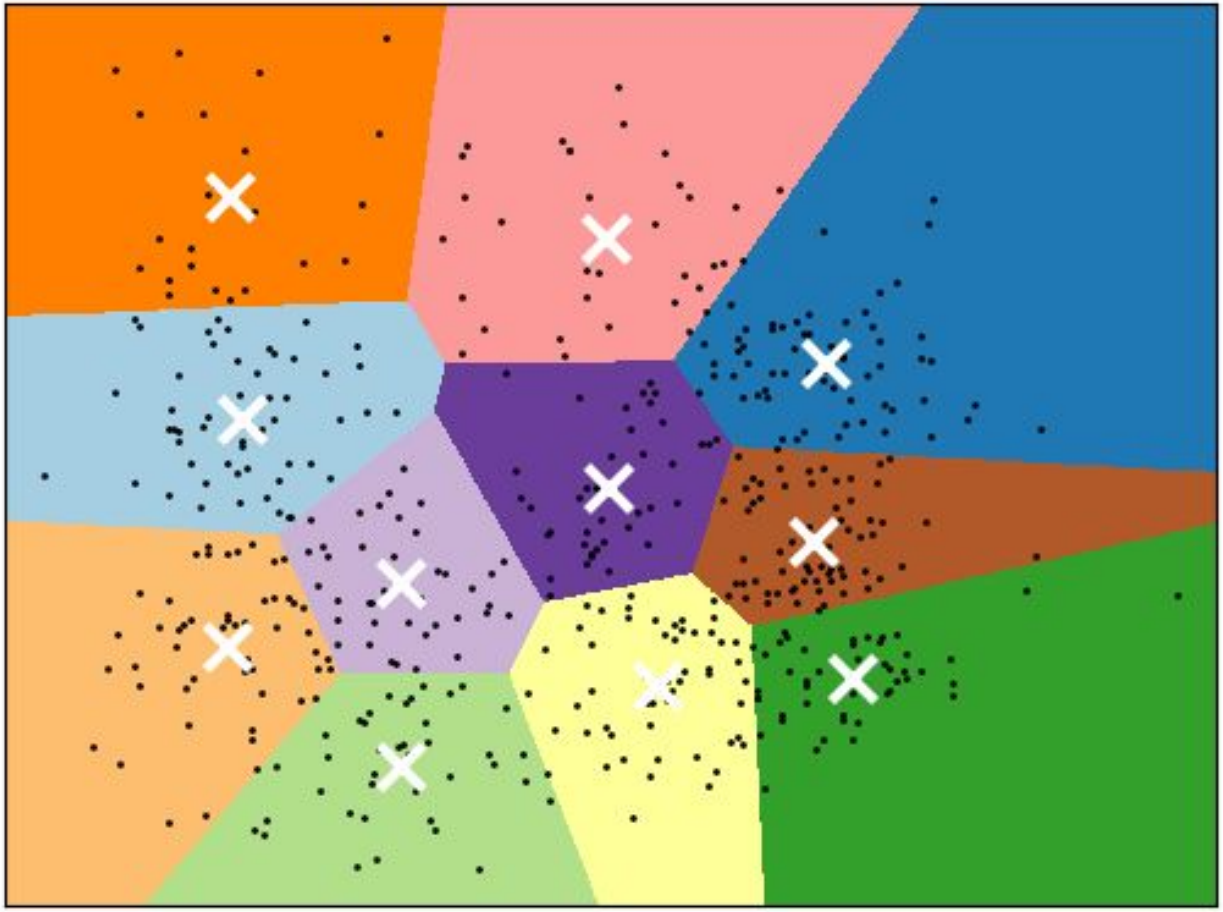
Figure: original image (left) and segmentation mask image (right)

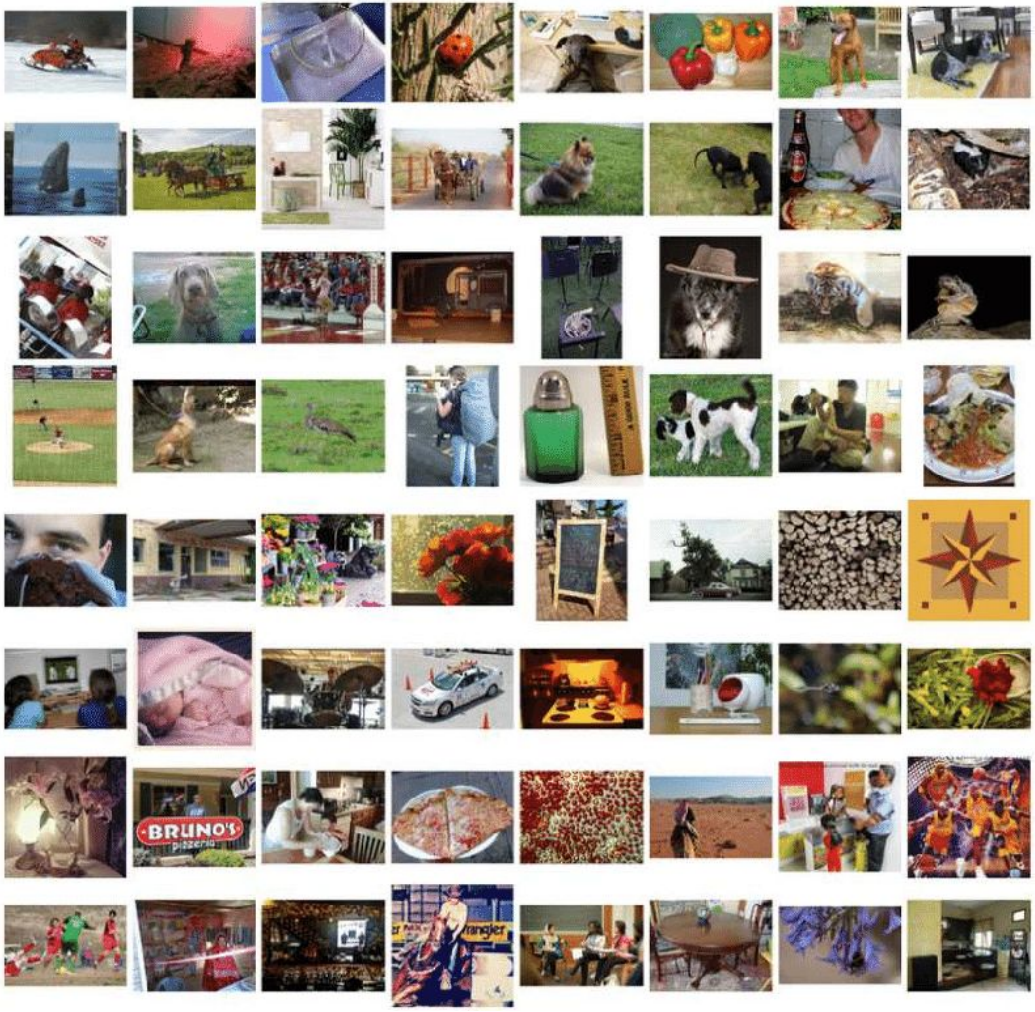
Cell Classification




0
200
400
600
800
1000

K-means clustering on the dataset (PCA-reduced data)
Centroids are marked with white cross




BRUNO'S
pizzeria

Conclusion

- **Optimize cellpose segmentation with less manual intervention in adjusting parameters and thresholds.**

- **Pretrained ResNet is trained on ImageNet, which could potentially generalize not so well on cell images. We could find other suitable pretrained models or train our own model if we can obtain the access to labeled data.**

Thank you!

Questions?