Automated Cell Structure Localization in Cellular Images

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Abstract

Current cell microscopy labs manually stain mammalian tumor cells with antibodies in order to visually identify cell structures – cilia, cilia base, and golgi apparatus. They are interested in the distance between the base of the cilia and the center of mass of the corresponding golgi apparatus. Measuring these distances requires manual labor and expert knowledge to accurately detect regions of interest and accurately decide the points in which to calculate a distance metric for. We propose a computer vision approach to automate this process. Our process involves: thresholding images of cells, clustering the points, and generating a convex hull around the clusters. We can then calculate a center of mass by integrating over the golgi apparatus and finding the intersection between the cilia and cilia base to determine the two points in which a distance metric can be calculated on.

Keywords

Computer-Aided Microscopy, Cellular Localization, Biological Imaging, Object Detection

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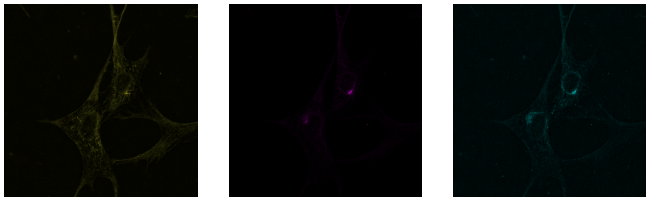

(a) Cilia Channel **(b) Cilia Base Channel** **(c) Golgi Apparatus Channel**

Figure 1: shows three channels of the same scene that depicts two cells and the location of their cilia (left), cilia base (middle), and the golgi apparatus (right) through a process that stains specific regions of interest.

1 Introduction

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2 Background

Put some background information here.

3 Methods

We are using computer vision techniques to threshold, cluster [1], generate convex hull, and then calculate distances.

3.1 Thresholding

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3.2 Distance Calculation

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4 Conclusion

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References

[1] Martin Ester, Hans-Peter Kriegel, Jörg Sander, and Xiaowei Xu. 1996. A Density-Based Algorithm for Discovering Clusters in Large Spatial Databases with Noise. In *Knowledge Discovery and Data Mining*. https://api.semanticscholar.org/CorpusID:355163