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# A review of open-source image analysis tools for mammalian cell culture: algorithms, features and implementations

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Abstract

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## Abstract

Cell culture is undeniably important for multiple scientific applications, including pharmaceuticals, transplants, and cosmetics. However, cell culture involves multiple manual steps, such as regularly analyzing cell images for their health and morphology. Computer scientists have developed algorithms

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to automate cell imaging analysis, but they are not widely adopted by biologists, especially those lacking an interactive platform. To address the issue, we compile and review existing open-source cell image processing tools that provide interactive interfaces for management and prediction tasks. We highlight the prediction tools that can detect, segment, and track different mammalian cell morphologies across various image modalities and present a comparison of algorithms and unique features of these tools, whether they work locally or in the cloud. This would guide non-experts to determine which is best suited for their purposes and, developers to acknowledge what is worth further expansion. In addition, we provide a general discussion on potential implementations of the tools for a more extensive scope, which guides the reader to not restrict them to prediction tasks only. Finally, we conclude the article by stating new considerations for the development of interactive cell imaging tools and suggesting new directions for future research. © Copyright 2023 Malik et al.

#### Author keywords

Cell culture; Image analysis; Microscopy; Open-source

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