



COMMENTARY

Open Access

Advantages and Challenges of Automated Mitosis Detection for Cancer Diagnosis

Ronald Whitbun*

Department of Histopathology, University of Valencia, Valencia, Spain

ARTICLE HISTORY

Received: 05-May-2023, Manuscript No. EJMJIH-23-97709;
Editor assigned: 08-May-2023, PreQC No. EJMJIH-23-97709 (PQ);
Reviewed: 22-May-2023, QC No. EJMJIH-23-97709;
Revised: 29-May-2023, Manuscript No. EJMJIH-23-97709 (R);
Published: 05-Jun-2023

Description

Mitosis is a fundamental biological process that involves the division of a single cell into two identical daughter cells. It is an essential step in the formation, growth, and repair of multicellular organisms. However, mitotic errors can lead to a variety of diseases, including cancer. Therefore, the accurate detection of mitosis is essential for both research and clinical applications. In recent years, automated mitosis detection methods have been developed to improve the accuracy and efficiency of this process.

Manual mitosis detection is a labour-intensive and time-consuming process that requires trained experts to visually identify mitotic cells under a microscope. This process involves examining large numbers of images to detect mitotic cells and counting the number of mitotic events per unit area. However, the accuracy of manual detection methods can be affected by observer variability and human error, which can lead to inconsistencies in results.

To overcome the limitations of manual detection methods, researchers have developed automated mitosis detection methods using image processing and machine learning techniques. These methods use computer algorithms to identify and classify mitotic cells in digital images, eliminating the need for manual inspection. Automated detection methods are more accurate and efficient than manual methods, and can analyze large numbers of images in a short amount of time. The first step in automated mitosis detection is the segmentation of individual cells in digital images. This involves separating the image into individual cells using image processing techniques, such as thresholding and edge detection. Once the cells have been segmented, the next step is to identify mitotic cells within the segmented images.

Several machine learning algorithms have been de-

veloped for mitosis detection, including Support Vector Machines (SVMs), random forests, and Convolutional Neural Networks (CNNs). These algorithms are trained on a large dataset of annotated images to learn the characteristics of mitotic cells and differentiate them from non-mitotic cells. SVMs are a type of supervised learning algorithm that can be used to classify images into mitotic and non-mitotic categories based on their features. SVMs use a kernel function to transform the input data into a higher-dimensional space, where it is easier to separate the classes. The algorithm then creates a boundary between the classes that maximizes the margin, or distance, between them.

Random forests are another machine learning algorithm that can be used for mitosis detection. Random forests is an ensemble learning method that consists of multiple decision trees. Each tree is trained on a subset of the data and generates a prediction based on its features. The final prediction is determined by aggregating the predictions of all the trees in the forest. CNNs are a type of deep learning algorithm that has shown promising results in mitosis detection. CNNs use multiple layers of interconnected neurons to extract features from images and classify them into different categories. The algorithm learns to recognize features in images through a process of training on a large dataset of annotated images. The deeper layers of the network learn more complex features, while the final layer produces the classification output.

Automated mitosis detection has several advantages over manual detection methods. It eliminates the subjective nature of manual detection, reduces the risk of human error, and increases the speed and efficiency of the process. Automated detection methods also have the potential to analyze large amounts of data and identify subtle changes in mitotic activity that

Contact: Ronald Whitbun, E-mail: ronaldw@gmail.net

Copyright: © 2023 The Authors. This is an open access article under the terms of the Creative Commons Attribution Non Commercial Share Alike 4.0 (<https://creativecommons.org/licenses/by-nc-sa/4.0/>).

may be missed by manual methods. However, there are still some challenges associated with automated mitosis detection. One major challenge is the heterogeneity of mitotic cells, which can make it difficult to accurately classify them. Mitotic cells can vary in size, shape, and

orientation, and can exhibit a range of morphological abnormalities. To overcome this challenge, researchers are developing more advanced machine learning algorithms that can account for the variability of mitotic cells.