

MITOS-RCNN: Mitotic Figure Detection in Breast Cancer Histopathology Images Using Region Based Convolutional Neural Networks

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Abstract : Studies estimate that there will be 266,120 new cases of invasive breast cancer and 40,920 breast cancer induced deaths in the year of 2018 alone. Despite the pervasiveness of this affliction, the current process to obtain an accurate breast cancer prognosis is tedious and time consuming. It usually requires a trained pathologist to manually examine histopathological images and identify the features that characterize various cancer severity levels. We propose MITOS-RCNN: a region based convolutional neural network (RCNN) geared for small object detection to accurately grade one of the three factors that characterize tumor belligerence described by the Nottingham Grading System: mitotic count. Other computational approaches to mitotic figure counting and detection do not demonstrate ample recall or precision to be clinically viable. Our models outperformed all previous participants in the ICPR 2012 challenge, the AMIDA 2013 challenge and the MITOS-ATYPIA-14 challenge along with recently published works. Our model achieved an F- measure score of 0.955, a 6.11% improvement in accuracy from the most accurate of the previously proposed models.

Keywords : breast cancer, mitotic count, machine learning, convolutional neural networks

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