Journal of Oncology Research and Treatment

Gumus and Duzyel, J Oncol Res Treat 2025, 10:1

Commentary Open Access

Advancing Breast Cancer Diagnosis Using Histopathology Images through Adaptive Resizer-Based Transfer Learning

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Description

Breast cancer is a significant global health concern, and accurate diagnosis plays a crucial role in determining appropriate treatment strategies and improving patient outcomes [1,2]. In recent years, there has been a growing interest in leveraging deep learning techniques to analyze histopathology images to aid in diagnosing breast cancer [3]. Histopathology images are rich in critical details, yet their extensive dimensions present difficulties for numerous computer-aided models. Memory limitations make training CNN models at elevated resolutions impractical, leading to a need for standardizing image sizes to fit deep learning training protocols. Therefore, spatial adjustments are frequently essential for effectively deploying computer-aided models in histopathology. Traditional resizing techniques such as nearest neighbor, bilinear, and bicubic, while quick, often lead to information loss, failing to preserve the fine details of the original image. Hence, innovative image-resizing strategies are needed to tackle these challenges for histopathology image analysis. In our recent article, we presented a novel approach that combines transfer learning and an adaptive resizer model to enhance the accuracy of breast cancer diagnosis [4]. In this commentary, we will discuss the key contributions of the article and highlight its potential implications for clinical practice.

Talebi and colleagues developed an innovative image resizer, designed to be trained in conjunction with classification models, aimed at improving their performance [5]. This novel resizer can substitute traditional methods, and while it doesn't elevate visual appeal, it notably increases model accuracy. The team evaluated their learnable resizer with four different models for classification with the ImageNet dataset, demonstrating superior performance over the bilinear resizer across all evaluations. In our article, we introduced an adaptive resizer-based transfer learning framework that addresses the challenge of resizing histopathology images while preserving their content and maintaining visual quality [4]. We offer an in-depth analysis of transfer learning models applied to the BreakHis dataset classification, incorporating a hybrid method with an adaptive resizer. We tested seven leading models and assessed their performances using bilinear interpolation and various resolutions with the adaptive resizer. We also carried out additional tests to classify different magnifications of the dataset, such as 40x, 100x, 200x, and 400x. Our research yields a critical understanding regarding the efficacy of transfer learning models with this specific dataset and underscores the significance of implementing an adaptive resizer to boost model performance.

Conventional resizing methods often result in data loss and may compromise the accuracy of computer-assisted models. The proposed framework overcomes these limitations by utilizing an adaptive learnable resizer model based on a Convolutional Neural Network (CNN) architecture. It ensures the preservation of fine details in the resized images. The article also highlights the importance of transfer learning in breast cancer diagnosis. Transfer learning allows the knowledge gained from pre-trained models to be leveraged for new tasks, thereby expediting the learning process, and improving accuracy [6]. By utilizing pre-trained models as a foundation, the proposed framework achieves higher accuracy on the target task while reducing the computational burden and training time. This is particularly relevant in the context of histopathology images, which are often large in spatial size and pose challenges for deep learning models.

The adaptive resizer based transfer learning framework presented in this article also has significant implications for clinical practice. Accurate breast cancer diagnosis is crucial for determining appropriate treatment strategies and improving patient outcomes. The proposed framework has the potential to enhance the accuracy of breast cancer diagnosis by improving the performance of computer assisted models in analyzing histopathology images. This can assist pathologists in making more accurate and reliable diagnoses, reducing the misdiagnosis rate, and improving patient outcomes. By enhancing the accuracy of computer assisted models in analyzing histopathology images, the proposed framework can potentially reduce misdiagnosis and improve patient care. Furthermore, the adaptive resizer based transfer learning framework presented in this article has implications beyond breast cancer diagnosis. The use of transfer learning and adaptive resizing techniques can be applied to other medical image analysis tasks, such as the diagnosis of other types of cancer or the detection of various diseases. The ability to leverage pre-trained models and optimize image resizing can significantly enhance the performance of deep-learning models in a wide range of medical imaging applications.

Conclusion

In conclusion, we presented a novel approach that combines transfer learning and an adaptive resizer model to improve the accuracy of breast cancer diagnosis. The framework addresses the challenges of resizing histopathology images while preserving their content and maintaining visual quality. The results demonstrate the effectiveness of the proposed approach in enhancing the performance of the deep learning models in medical image analysis. The ability of the adaptive resizer to be applied broadly across multiple image classification challenges, along with its adaptability with various CNN models, underscores its flexibility and strength as an instrumental

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Received: 16-October-2023, Manuscript No. AOT-23-116878; **Editor assigned:** 18-October-2023, PreQC No. AOT-23-116878 (PQ); **Reviewed:** 01-November-2023, QC No. AOT-23-116878; **Revised:** 08-January-2025, Manuscript No. AOT-23-116878 (R); **Published:** 15-January-2025, DOI: 10.4172/aot.1000306

Citation: Gumus A, Duzyel O (2025) Advancing Breast Cancer Diagnosis using Histopathology Images through Adaptive Resizer-Based Transfer Learning. J Oncol Res Treat 10: 306.

asset for not only medical image examination but also for an array of computer vision endeavors. The implications of this research extend beyond breast cancer diagnosis, with potential applications in other medical image analysis tasks. Overall, this article contributes to the advancement of deep learning techniques in breast cancer diagnostics and holds promise for improving patient care and outcomes.

References

1. Kolak A, Kaminska M, Sygit K, Budny A, Surdyka D, et al. (2017) Primary and secondary prevention of breast cancer. Ann Agric Sci 24.
2. Weigel S, Heindel W, Heidrich J, Heidinger O, Hense HW (2016) Reduction of advanced breast cancer stages at subsequent participation in mammography screening. Georg Thieme Verlag KG 188: 33-37.
3. Abbasniya MR, Sheikholeslamzadeh SA, Nasiri H, Emami S (2022) Classification of breast tumors based on histopathology images using deep features and ensemble of gradient boosting methods. 103: 108382.
4. Duzyel O, Catal MS, Kayan CE, Sevinc A, Gumus A (2023) Adaptive resizer based transfer learning framework for the diagnosis of breast cancer using histopathology images. Signal Image Video P 17: 4561-4570.
5. Talebi H, Milanfar P (2021) Learning to resize images for computer vision tasks IEEE 497-506.
6. Yao X, Wang X, Wang SH, Zhang YD (2022) A comprehensive survey on convolutional neural network in medical image analysis. Multimed Tools Appl 81: 41361-41405.