



Role of Artificial Intelligence in Grading Gliomas Using the EfficientNetB0 Model and MRI Datasets

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ABSTRACT

Introduction: Gliomas are primary brain tumors originating from glial cells with various aggressiveness. The precise grading of gliomas is crucial for planning effective treatment strategies and conducting ongoing patient evaluations. Histopathological grading of gliomas is expensive and time-consuming. Nowadays, the combination of artificial intelligence (AI) algorithms and medical imaging techniques, especially magnetic resonance imaging (MRI), has led to provide non-invasive, safe, rapid, and cost-effective diagnostic methods for grading gliomas. This review highlights how AI plays a key role in accurately grading gliomas.

Search Strategy: We searched keywords such as “artificial intelligence”, “gliomas”, “grading”, and “MRI” in the PubMed, Google scholar, Elsevier and IEEE. The most current and relevant articles were extracted and reviewed. Then grading gliomas tumors with an AI algorithm using MRI images was evaluated.

Results: The study findings suggest that utilizing AI algorithms and MRI image datasets for grading gliomas yields favorable results with high specificity, sensitivity, and accuracy. The researchers studied new automated detection and classification models in AI along with MRI datasets. Among AI models, EfficientNetB0 is one of the most effective models, achieving over 0.98 on the validation set for specificity, sensitivity, and accuracy. The model attained high accuracy with fewer parameters and reduced computational costs compared to traditional convolutional neural networks. Additionally, its scalability makes it versatile and adaptable to various requirements and constraints.

Conclusion and Discussion: MRI is a highly precise method for detecting tumors like gliomas compared to current techniques. AI models, especially EfficientNetB0, with excellent specificity, sensitivity, and accuracy, play an important role in grading gliomas. Training future medical professionals in the effective use of AI is essential for its integration into clinical practice in the coming years.

Keywords: Artificial intelligence, Glioma, Magnetic resonance imaging