Revolutionizing Eye Care: AI-Assisted Detection of Choroidal Melanoma

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Choroidal melanoma is a rare cancerous eye tumor that affects approximately six in one million Caucasian individuals (Soliman et al., 2023). About 50% of patients develop metastasis, meaning the cancer spreads to other parts of the body (Durden, 2023). This tumor can be challenging to detect because of its shared visual features and asymptomatic tendencies with choroidal nevus, a benign lesion (Cheung et al., 2012). Early detection of choroidal melanoma is crucial for increasing survival rates and more successful treatment outcomes. Artificial Intelligence (AI) can contribute to the reduction of misdiagnoses, leading to more informed decisions by improving diagnostic accuracy and facilitating early classification, which is vital for successful treatment outcomes. This investigation implements the use of AI, specifically Convolutional Neural Networks (CNNs), as a classification tool for choroidal melanoma using retinal images. The pre-trained model's performance was evaluated using precision and recall, which were balanced to measure overall accuracy. Results demonstrated 96% accuracy in detecting choroidal melanoma, with a recall of 100%. Similarly, high accuracy was observed for other classes, with 96% for healthy eyes and 95% for other eye diseases. The model’s potential to support early detection and classification demonstrates high reliability; however, AI should serve as an assistive tool rather than a standalone diagnostic instrument. By improving early detection and reducing the risk of late diagnoses, AI presents a promising step forward in enhancing patient outcomes and advancing ophthalmic diagnostics.

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