

Advancements in Glaucoma Diagnosis: A Comprehensive Literature Survey on CNN-based Deep Learning Approaches

Uday M P¹, Srujan T², Dr Asha K H³

Associate Professor, Department of Information Science and Engineering³
Undergraduate Student, Department of Information Science and Engineering^{1,2}
Global Academy of Technology, Bengaluru, India
udaymgd1@gmail.com¹, srujanntt@gmail.com², asha.kh06@gmail.com³

Abstract: *This literature survey review explores advancements in glaucoma diagnosis using convolutional neural networks (CNNs) within the realm of deep learning (DL). Glaucoma, a chronic and irreversible eye disease leading to vision deterioration, poses a significant global health challenge. Traditional diagnosis through colour fundus images is time-consuming, requiring skilled clinicians. The paper examines the development of a six-layered CNN architecture, integrating dropout and data augmentation techniques to enhance diagnostic accuracy. Focused on identifying intricate features like microaneurysms, exudate, and hemorrhages on the retina, this CNN-based approach offers a streamlined and efficient alternative to manual diagnosis. With glaucoma being a leading cause of blindness worldwide, the proposed methodology, trained on high-performance GPUs, presents a promising avenue for improving diagnostic efficiency and accuracy, thereby contributing to the evolution of glaucoma diagnosis*

Keywords: Glaucoma, Convolutional Neural Networks (CNN), Deep Learning (DL), Retinal Imaging, Colour Fundus Images, Blindness

REFERENCES

- [1]Ferreira, Marcos Melo, Geraldo Braz Junior, João Dallyson Sousa de Almeida, and Anselmo Cardoso Paiva. "Glaucoma Grading Using Multimodal Imaging and Multilevel CNN." *IEEE Latin America Transactions* 21, no. 10 (2023): 1095-1102.
- [2]Ashtari-Majlan, Mona, Mohammad Mahdi Dehshibi, and David Masip. "Deep Learning and Computer Vision for Glaucoma Detection: A Review." *arXiv preprint arXiv:2307.16528* (2023).
- [3]Shoukat, Ayesha, Shahzad Akbar, Syed Ale Hassan, Sajid Iqbal, Abid Mehmood, and Qazi Mudassar Ilyas. "Automatic Diagnosis of Glaucoma from Retinal Images Using Deep Learning Approach." *Diagnostics* 13, no. 10 (2023): 1738.
- [4]Oguz, Cinare, Tolga Aydin, and Mete Yaganoglu. "A CNN-based hybrid model to detect glaucoma disease." *Multimedia Tools and Applications* (2023): 1-19.
- [5]Elmoufidi, Abdelali, Ayoub Skouta, Said Jai-Andalousi, and Ouail Ouchetto. "CNN with multiple inputs for automatic glaucoma assessment using fundus images." *International Journal of Image and Graphics* 23, no. 01 (2023): 2350012.
- [6]Esengönül, Meltem, and António Cunha. "Glaucoma Detection using Convolutional Neural Networks for Mobile Use." *Procedia Computer Science* 219 (2023): 1153-1160.
- [7]Singh, Sukhpal, Nitigya Sambyal, and Ashutosh Aggarwal. "Automated Glaucoma Detection Using Deep Convolutional Neural Networks." (2023).
- [8]Karthika, A., G. Nallasivan, and M. Vargheese. "GLAUCOMA DETECTION IN RETINAL FUNDUS IMAGES USING DEEP CONVOLUTION NEURAL NETWORK."
- [9]Saha, Sajib, Janardhan Vignarajan, and Shaun Frost. "A fast and fully automated system for glaucoma detection using color fundus photographs." *Scientific Reports* 13, no. 1 (2023): 18408.

- [10]Juneja, Mamta, Sarthak Thakur, Archit Uniyal, Anuj Wani, Niharika Thakur, and Prashant Jindal. "Deep learning-based classification network for glaucoma in retinal images." *Computers and Electrical Engineering* 101 (2022): 108009.
- [11]Shyamalee, Thisara, and Dulani Meedeniya. "Glaucoma detection with retinal fundus images using segmentation and classification." *Machine Intelligence Research* 19, no. 6 (2022): 563-580.
- [12]Veena, H. N., A. Muruganandham, and T. Senthil Kumaran. "A novel optic disc and optic cup segmentation technique to diagnose glaucoma using deep learning convolutional neural network over retinal fundus images." *Journal of King Saud University-Computer and Information Sciences* 34, no. 8 (2022): 6187-6198.
- [13]Islam, Mir Tanvir, Shafin T. Mashfu, Abrar Faisal, Sadman Chowdhury Siam, Intisar Tahmid Naheen, and Riasat Khan. "Deep learning-based glaucoma detection with cropped optic cup and disc and blood vessel segmentation." *IEEE Access* 10 (2021): 2828-2841.
- [14]Alghamdi, Manal, and Mohamed Abdel-Mottaleb. "A comparative study of deep learning models for diagnosing glaucoma from fundus images." *IEEE access* 9 (2021): 23894-23906.
- [15]P.M. Siva Raja and S. L. Jothilakshmi. "Deep Learning Algorithms and Glaucoma Detection: A Review." *International Research Journal of Engineering and Technology (IRJET)* 8, no. 02 (February 2021): 1185. e-ISSN: 2395-0056, p-ISSN: 2395-0072.