Eye Disease Diagnosis Using Deep Learning

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Eye diseases can potentially cause blindness in patients. Cataracts are the leading cause of blindness, accounting for over 51% of blindness worldwide. Glaucoma and diabetic retinopathy follow, taking second and third place, respectively. The symptoms of these diseases are very similar making diagnosis difficult. Some may go unnoticed during the early stages, allowing faster development in untreated eyes. The accuracy for diagnosing these diseases through gold standard meticulous exams averages 95%. This research used artificial intelligence techniques to identify these diseases from fundus photos. The two methods used were Convolutional Neural Networks and vision transformers. The CNN surpassed the vision transformer's performance, obtaining a 95.47% accuracy, while ViT obtained an 80%. The CNN model predicted diabetic retinopathy with the most accuracy, at 100%, and a normal eye with the least accuracy of 90%. Additionally, it detected cataracts with 95% accuracy and glaucoma with 92% accuracy. Comparing these results through a T-test, the results provided evidence to reject the null hypothesis. Therefore, the CNN model, with a 95% confidence level, significantly surpasses the average medical diagnosis accuracy.

Awards Won: