# Review of: "Rules Extraction, Diagnoses and Prognosis of Diabetes and its Comorbidities using Deep Learning Analytics with Semantics on Big Data"

Amandeep Kaur[1]

1 Chitkara University

Potential competing interests: No potential competing interests to declare.

The manuscript presents an important and relevant research study on the automated detection of diabetic retinopathy using deep learning techniques applied to color fundus images. Diabetic retinopathy is a significant cause of blindness among working-age adults, and early detection is crucial for better prognosis. The use of convolutional neural networks (CNNs) for diabetic retinopathy staging is explored in this paper, and the results achieved are comparable to baseline literature results, with a commendable validation sensitivity of 95%.

One of the notable findings of this research is that errors in classification mostly occur in the misclassification of mild disease as normal. The authors attribute this to the CNN's inability to detect subtle disease features. To address this limitation, the authors experimented with preprocessing techniques, specifically contrast limited adaptive histogram equalization, which improved the recognition of subtle features. This improvement highlights the significance of proper data preprocessing in enhancing the accuracy of the automated detection system.

Additionally, the authors explored multinomial classification models and performed transfer learning using pretrained GoogLeNet and AlexNet models from ImageNet. The results showed peak test set accuracies of 74.5%, 68.8%, and 57.2% on 2-ary, 3-ary, and 4-ary classification models, respectively. This experimentation with different classification models and transfer learning approaches adds depth to the research and provides valuable insights into the performance of the system under various scenarios.

Furthermore, the study ensures dataset fidelity by expert verification of class labels, which contributes to the robustness and reliability of the automated detection system. Expert verification is an essential step in medical imaging analysis to minimize the chances of mislabeling and enhance the credibility of the results.

Overall, this paper makes a significant contribution to the field of diabetic retinopathy detection through its thorough exploration of deep learning techniques and classification models. The achieved sensitivity of 95% in detecting diabetic retinopathy is noteworthy and can have a positive impact on early diagnosis and treatment. The insights gained from preprocessing techniques and transfer learning provide valuable knowledge for future research in this area.

However, there are a few points that need further clarification. The authors should provide more details about the dataset used, such as the size, demographics, and acquisition protocol of the fundus images. Additionally, it would be beneficial to

elaborate on the expert verification process for class labels to ensure transparency and reproducibility of the results.

Finally, the authors may want to discuss the generalizability of their models to different datasets and populations. The inclusion of external validation on independent datasets would strengthen the validity and applicability of the proposed automated detection system.

In conclusion, this manuscript is well-written and presents valuable insights into the use of deep learning for automated diabetic retinopathy detection. With some minor clarifications and additional validation, this research can have a significant impact on improving the diagnosis and management of diabetic retinopathy.