
DIABETIC RETINOPATHY SCREENING DEEP LEARNING-BASED APPROACH

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TAKEAWAY

Retmarker's Deep Learning algorithm for DR Screening shows improved performance and immediate results



Abstract EASDEC 2019 – Diabetic Retinopathy Screening Deep Learning-based approach

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Title of Abstract: Retmarker Screening alternative Deep Learning algorithm also increases Burden Reduction in DR Screening Programs.

Design of Study: Retrospective study to evaluate performance of a Deep Learning-based method for the automated screening of Diabetic Retinopathy (DR) (integrated in Retmarker Screening, Retmarker SA, Coimbra, Portugal) with resource to anonymized data from our screening programs.

Purpose: Evaluate Sensitivity and Specificity of the new approach measuring its safety in the identification of sight threatening referable DR and correspondent burden reduction, aiming on complementing Retmarker Screening technology.

Methods: Retmarker technology has been employed in DR Screening Programs since 2011 with more than 250.000 screening exams performed. Sensitivity and Specificity values are in the order of 95% and 65% respectively.

A new method for the identification of the presence of DR in colour fundus photographs was developed using a Deep Learning-based approach (Convolutional Neural Networks, CNN).

A CNN model was trained using a dataset of 22.661 images with signs of referable DR and 39.066 images without signs of referable DR with a Disease/No Disease labelling. This model was later tested on 51.155 anonymized exams of our screening programs (2 images per eye, Macular and Optic Disc-centered, no overlap with training images). These exams represent reality of a screening program (includes Not Classifiable images or non-retinal images, image protocol not respected, etc.)

Results: The new method applied to the test dataset (51.155 patients) presented a Sensitivity of 90.56% and a Specificity of 89.06%. Average processing time per image was 0,1s.

Conclusions: The new approach shows good performance, in line with previous machine learning approaches (specificity of around 90%) allowing a significant Burden Reduction to our customers. These results were obtained on a more significant and representative dataset and with a negligible processing time per image.