

# Accepted Manuscript

A new unified framework for the early detection of the progression to diabetic retinopathy from fundus images

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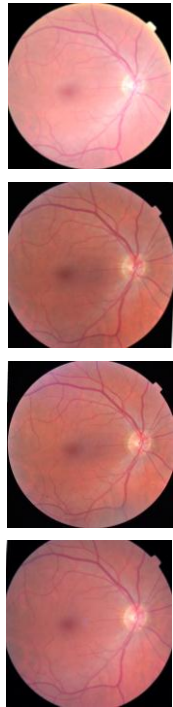
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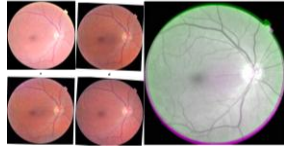
# FRiAReD

INPUT



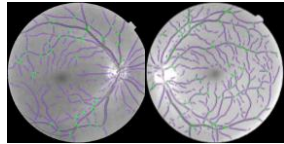
STEPS

1 Image registration



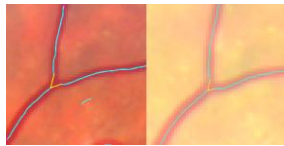
Registered images

2 Image segmentation



Segmented images

3 Matching of bifurcations



Zoomed bifurcations

4



Features' extraction



Statistical Analysis

LMMs  
Post-hoc

Feature selection process

RRF  
Elastic-net  
Boruta

Classification

Random Forests  
Logistic regression

Validation

Cross-validation  
Bootstrap 0.632+

Performance

ROC  
AUC  
Kappa  
OOB

OUTPUT

a) Features' Evaluation

b) Classification/Detection

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