# DRSCREEN - Developing a computer based image processing system for diabetic retinopathy screening

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## Introduction

The aim of the DRSCREEN project is to develop an automated image analysing system for retinopathy screening. In 1997 an estimated 124 million people had diabetes worldwide. This is expected to nearly double by 2010. At any point in time, approximately 40% of persons with diabetes have diabetic retinopathy, of which an estimated 5% have the sightthreatening form of this disease. DR can be prevented and its progression slowed down if diagnosed and treated early. Screening for DR is the mainstay of identifying patients at risk.

## Participants

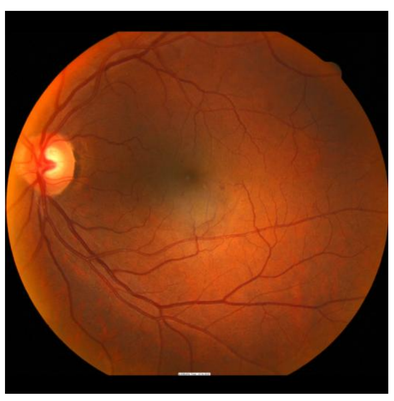
The DRSCREEN project is a joint contribution of the following partners:

- Kripto Research Ltd., Debrecen, Hungary
- 3T Research Ltd., Debrecen, Hungary
- University of Debrecen, Hungary
- Moorfields Eye Hospital, London, UK

## Screening

Fundus images are taken at eye hospitals or screening centers.

Fundus camera



Fundus of the eye

## Acknowledgement

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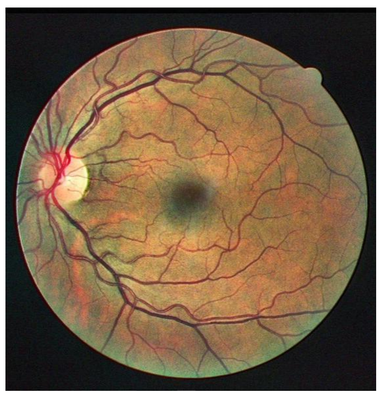
NKTH Nemzeti Kutatási és Technológiai Hivatal

## Web-based system

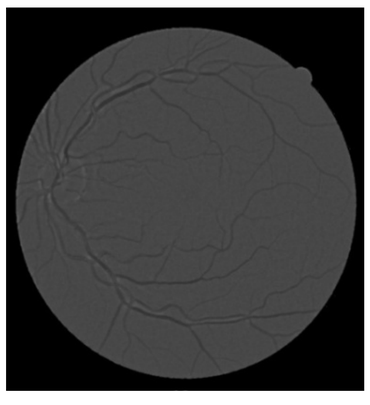
The image is uploaded for analysis using a website.

## Preprocessing

Images are preprocessed to enhance their interesting parts. We are using several preprocessing methods, e.g. Constrast Limited Adaptive Histogram Equalization (CLAHE) and shade correction.



CLAHE

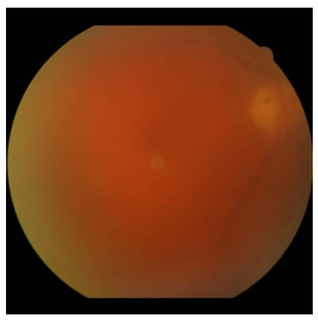


Shade correction

## Prefiltering

Non-fundus, low quality images and the ones that contain serious disorders are excluded from the further analysis.

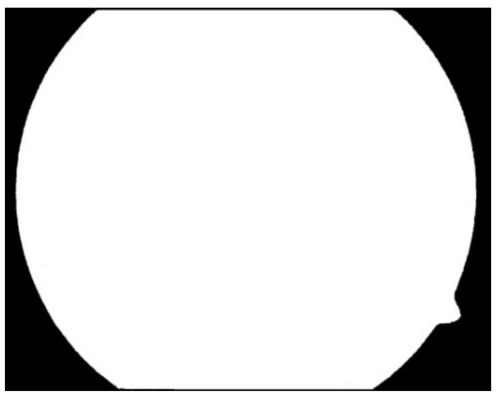
Serious disorder



Low quality

## Region of interest selection

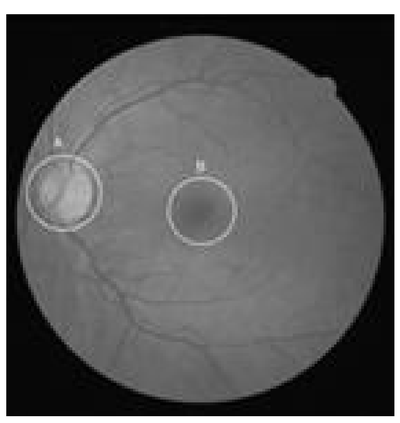
We are using the interesting part of the image for processing. For lesion detection, we can also extract regions which are very likely to contain lesions.



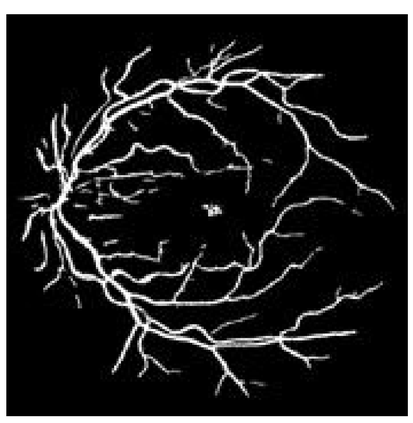
Region of interest

## Detection of anatomical parts

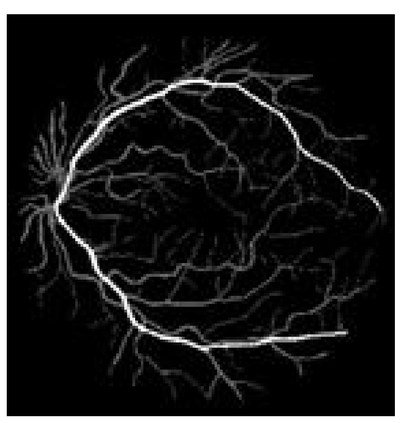
The detection of anatomical parts is essential for grading. We can accurately segment the macula, the optic disc, the vessel system and the temporal archade.



Optic disc and macula



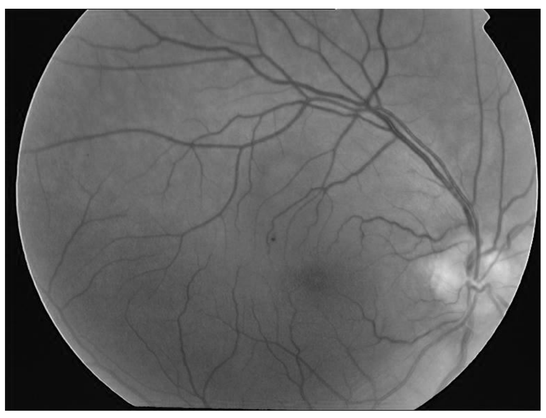
Vessel system



Temporal archade

## Detection of lesions

The result of screening is determined by the recognizable lesions of the retina. These lesions include e.g. microaneurysms, haemorrhages, exudates. We are currently working on a committee machine for microaneurysm detection.



Original image

Microaneurysm found with no false predicitions