

# MEDICAL DECISION SUPPORT SYSTEM OPTIMIZATION

## The Industrial Problem

Sightspot Network Ltd. (Hungary) was interested in optimizing the components of image processing-based medical decision support systems to improve their efficiency and accuracy.

### University of Debrecen



UNIVERSITY of  
**DEBRECEN**

Studying industrial problems using mathematical tools with emphasis on medical decision support and automotive developments.

### Sightspot Network Ltd.



SME that develops mobile applications and special purpose software solutions.

Research  
group

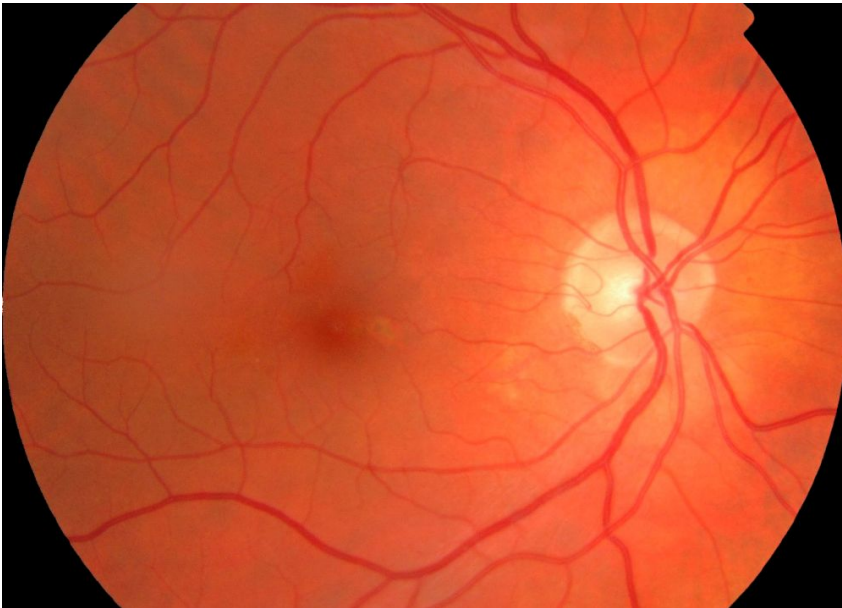
Company

SZÉCHENYI 2020

# MEDICAL DECISION SUPPORT SYSTEM OPTIMIZATION

## Challenges & Goals

- To select the optimal components of image processing-based DSS systems.
- To optimize the parameters of the selected components.
- To improve the accuracy of the decision support.
- To reduce cost and running time of the whole system.



*Example application: recognition of age-related macular degeneration (normal (left) and diseased (right))*

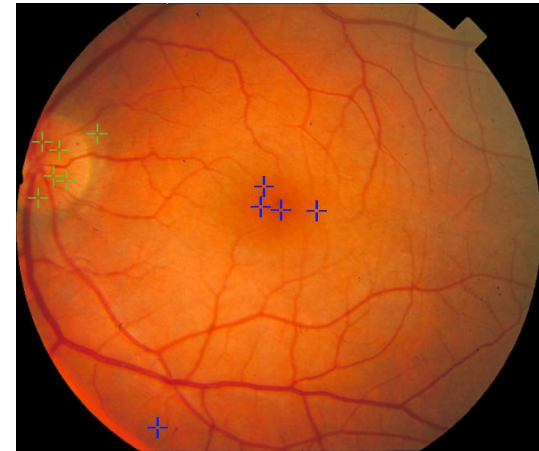
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## Mathematical and computational methods and techniques applied

- Mathematical characterization of composite image processing-base medical decision support systems having the highest performance under an additional constraint on the total cost (e.g., running time).
- Stochastic optimization for the selection of the member algorithms and their parameter settings that maximizes accuracy considering large image training data sets and cost constraints.



*Input retinal image*

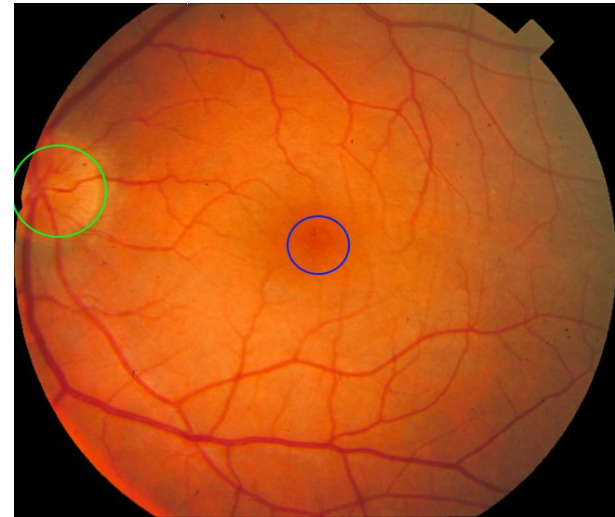


*Automatic optic disc (green) and  
macula (blue) center candidates*

# MEDICAL DECISION SUPPORT SYSTEM OPTIMIZATION

## Results & Benefits to the company

- A preliminary strategy to select and fine-tune the components of different image processing-based medical decision support systems.



*Sample output of the optimized system*

The company has a methodology to optimize image processing systems considering different cost constraints.