Extracting medically relevant features of the human retina

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UNIL BSc course: **Solving Biological Problems that require Math 2018**

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The Retina is the only part of the cardiovascular system that can be observed nonintrusively

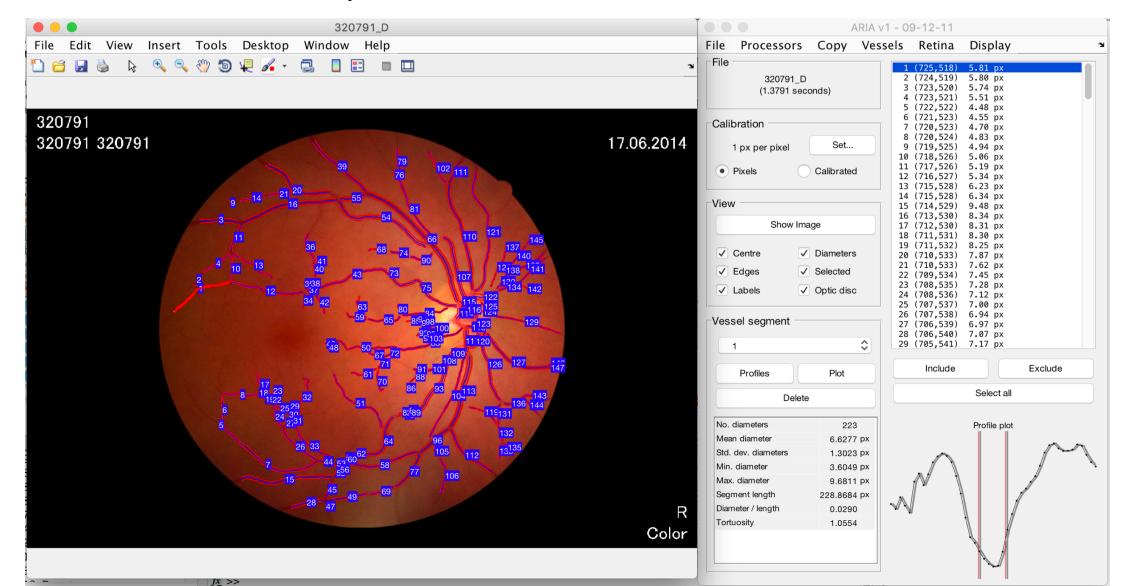# Retinal images features are implicated in disease

Diseases:
- Macular degeneration
- Diabetic retinopathy
- Glaucoma
- Hypertension
- Atherosclerosis

Features:
- vessels size
- vessels tortuosity
- vessels branching coefficients
- size and color of the optic disk
- overall color of the fundus
- discontinuity of the fundus

We use computers to extract such features

Aim of the Project

The aim of this project is to **implement a computer program** to manipulate retinal images
with the objective of **extracting numerical values** that could be used to **assess the state of health of an individual**.

Tools

- **Computational Tools**: Students will be asked to write a MATLAB program to manipulate 2D retinal images. The task will be simplified by the use of a MATLAB library called "Image processing Toolbox".

- **Mathematical tools**: Students will be asked to use simple statistics (comparison of probability distributions) to assess whether the features they have extracted carry information.

- **Biological or Medical aspects**: the state of our retinal provides information about diseases such as hypertension, atherosclerosis, macular degeneration, retinopathy, glaucoma of the eye.

Thank you

Questions?