

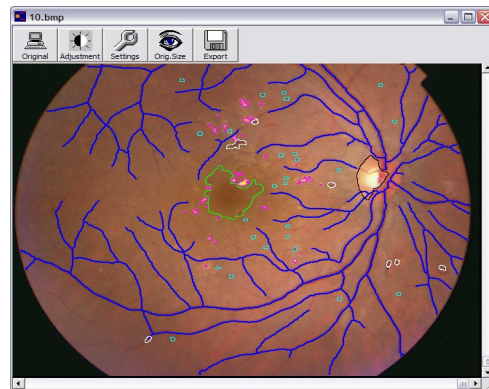
Automated lesion detection in retinal images

Retinal Analysis Tool, an Aphelion™ stand-alone application, is an advanced and powerful tool for studying the fundus of the eye using angiographic images. The Tool's processing of fundus images is fully automatic. Its underlying methodology was originally developed in partnership with two prestigious institutes: the Center for Mathematical Morphology at the School of Mines in Paris, and the Lariboisière Hospital in Paris, France¹¹.

Current use of the Retinal Analysis Tool is for disease research only. However, this software is also available for integration into system applications for clinical uses, subject to approval by applicable regulatory agencies. Such applications could include diabetic retinopathy and age-related macular degeneration (ARMD).

The following tasks are performed on a color, angiographic image without human interaction:

- Filtering to enhance the image
- Locating the papilla (the optical nerve)
- Analyzing the blood vessel network
- Detecting the branching



Detection of retinal lesions

Image Name	ASL	MSL	Detected μ	μ TP	μ FP	μ FN	μ Sensitivity	μ Prec Value	Det F-Statistic	Det Hemo
1: 01.bmp	x		9					0.0024	4	
2: 02.bmp	x		29					0.1501	24	
3: 03.tif	x		1					0.0000	2	
4: 04.bmp	x		3					0.0000	2	
5: 05.tif	x		2					0.2342	2	
6: 06.bmp	x		0					0.0000	1	
7: 07.bmp	x		36					0.6646	30	
8: 11.bmp	x		1					0.7156	2	
9: 12.bmp	x		0					0.0000	0	
10: 13.bmp	x		10					0.3740	16	
11: 14.bmp	x		0					0.0000	1	

Comparison between manual and automatic results (Processed images = 11)	Mean TP	Mean FP	Mean FN	Mean Sensitivity	Mean Prec. Value
	1.00	0.00	0.00	0.10	1.00

In addition to its graphical user interface and image processing tools, a set of measurements is provided to quantify images:

- aneurysm count
- Number of vessel network branch points
- Mean blood vessel diameter
- Papilla size to evaluate glaucoma progression
- Image and papilla densitometry data

Graphical User Interface

Main Benefits of the Aphelion™ Retinal Analysis Tool:

- Provides reproducible results
- Same technique can be applied to retinal biometry applications
- Easy-to-use application requiring no training or software expertise
- Images and measurements are automatically saved to an accessible database

¹ The original developers can annotate images to manually mark lesions