Longitudinal analysis of AF in NHP baseline in vivo retinal images

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Computer vision objectives

- Utilize NHP eye imaging data to develop an automated computer vision software algorithm for the automated detection and quantification of hyper-fluorescent signals on fundus fluorescence images
- Identify the presence of auto-fluorescent signal at prior to injection
- Compare pre- and post-injection images for Visit 1 (prior to surgery-induced disease) to determine if there are increased number of hyper-fluorescent puncta after injection (determine specificity of methodology)
- Compare pre- and post-injection images for Visit 2 (~1 month after surgery-induced disease) to determine if there are increased number of hyper-fluorescent puncta after injection
- Compare Visit 1 and Visit 2 post-injection images (by same time point(s), by eye)

Summary of data & findings

- 24 eyes from 12 NHP over 2 visits 3 months apart
- AF channel images were acquired prior to and 2 min, 5 min, 15 min & 20 min post dye injection
- 2 of 13 eyes exhibit no auto-fluorescent (AF) puncta prior to injection

- Multiple analysis parameters to optimize:

1. Detection -> contrast threshold, edge threshold, #layers in SIFT octave, Gauss filter sigma
2. Matching -> method, match threshold, max. ratio, distance metric, uniqueness

Three types of features for matching: AF puncta, blood vessels' branching points, optical nerve head

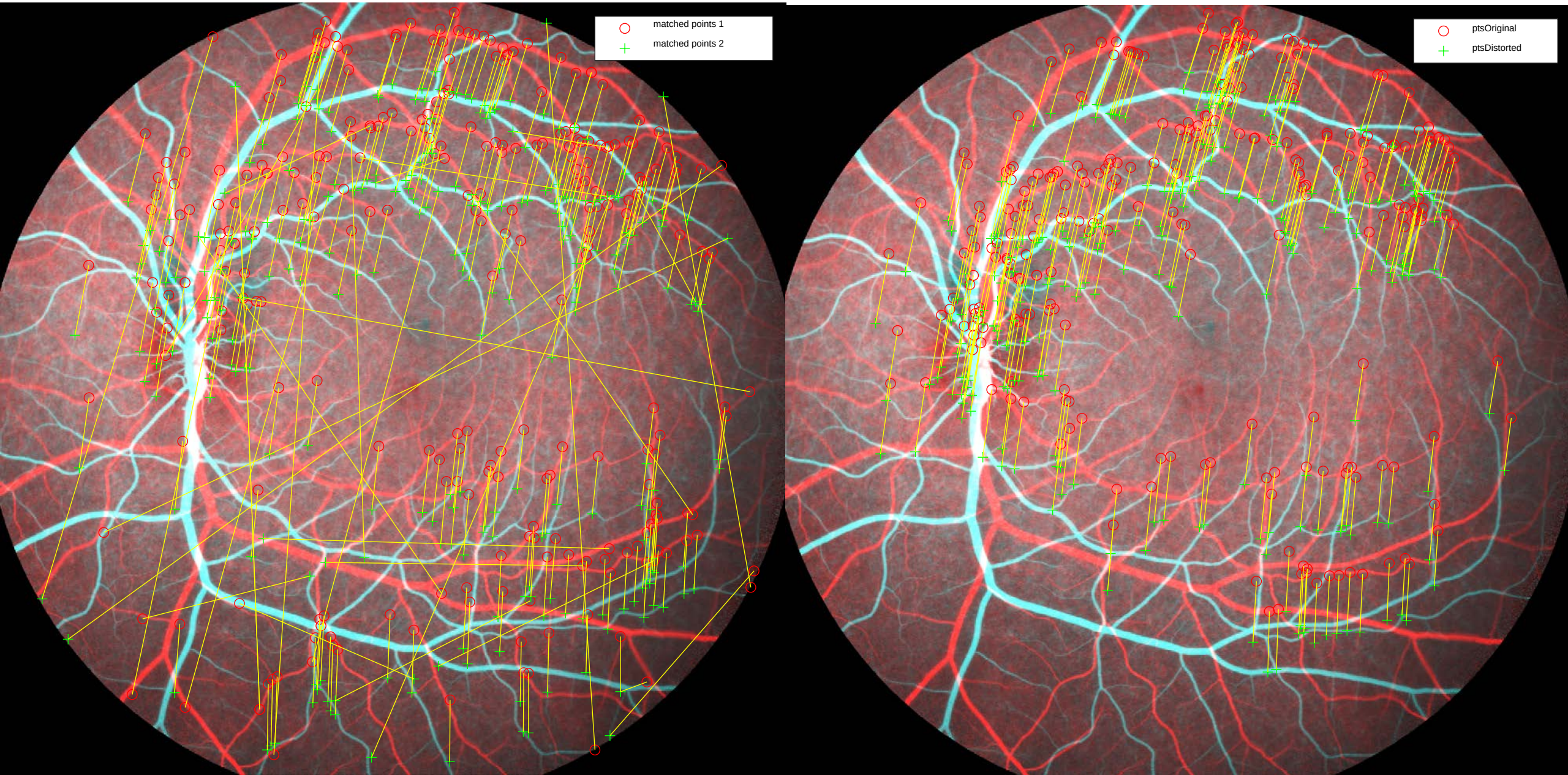
Two types of matching approaches: Scale-invariant feature transform, Speeded up robust features

SIFT by Canadian David Lowe in Toronto, SURF by Dutch Luc van Gool in Zurich

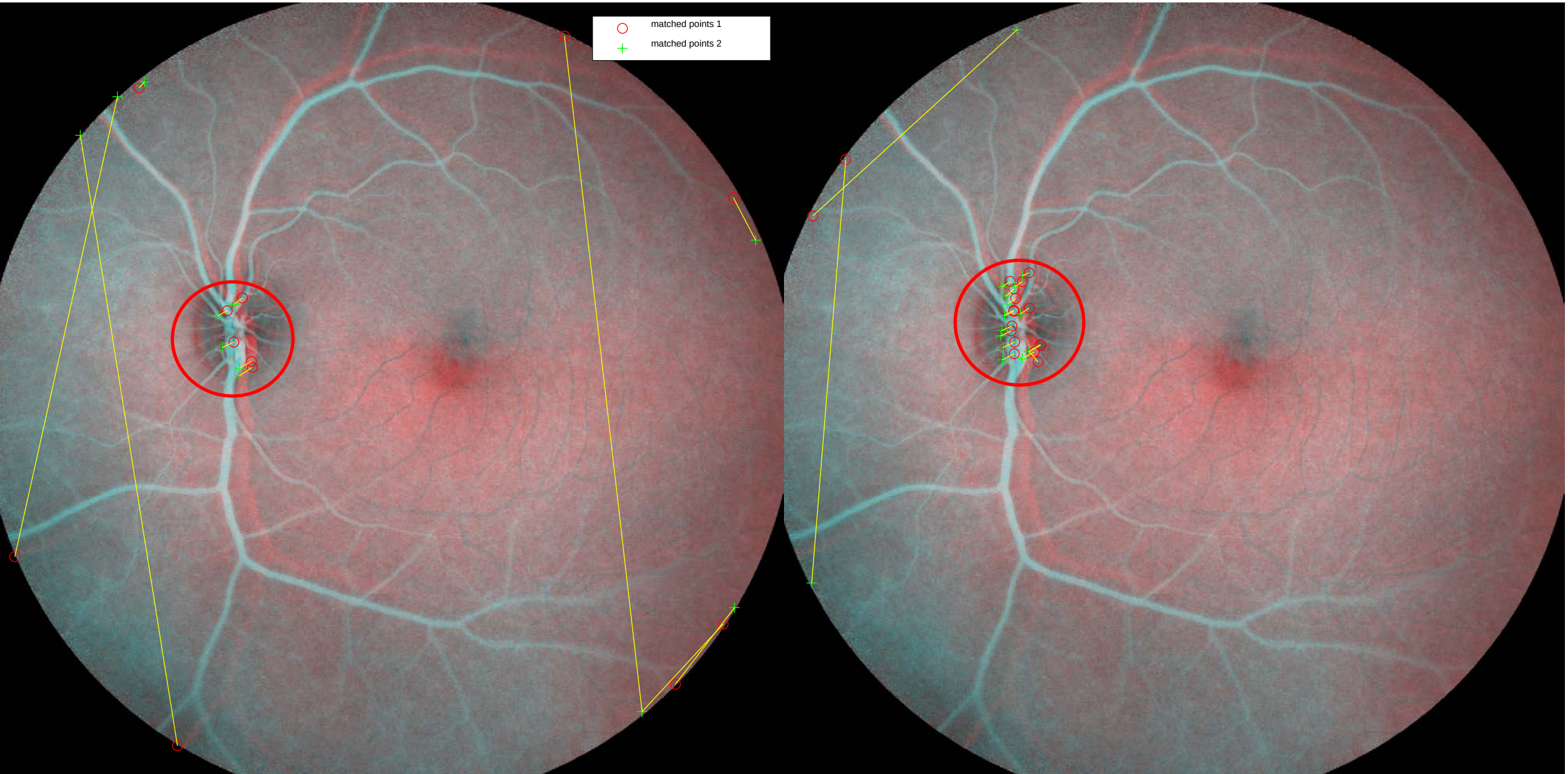
AF puncta matches with SIFT or SURF

		Post2min V1-V2	Post5min V1-V2	Post15min V1-V2	Post30min V1-V2
Cyno 170395	OD	0	0	0	0
Cyno 170395	OS	na	na	na	na
Cyno 180424	OD	na	na	na	na
Cyno 180424	OS	0	0	0	0
Cyno 191797	OD	na	na	na	na
Cyno 191797	OS	0	na	0	0
Cyno 191800	OD	na	na	na	na
Cyno 191800	OS	0	0	0	0
Cyno 191815	OD	na	na	na	na
Cyno 191815	OS	0	0	0	0
Cyno 191817	OD	na	na	na	na
Cyno 191817	OS	0	0	0	0
Cyno 191823	OD	na	na	na	na
Cyno 191823	OS	0	0	0	0
Cyno 200188	OD	0	0	0	0
Cyno 200188	OS	0	0	0	1
Cyno 200190	OD	na	na	na	na
Cyno 200190	OS	0	0	0	0
Cyno 200193	OD	na	na	na	na
Cyno 200193	OS	0	0	0	0
Cyno 200217	OD	na	na	na	na
Cyno 200217	OS	0	0	0	0
Cyno 200251	OD	na	na	na	na
Cyno 200251	OS	0	0	0	0

Cyno 191823 OS, V1 to V2 Post 2min, SIFT (L) & SURF(R) matches

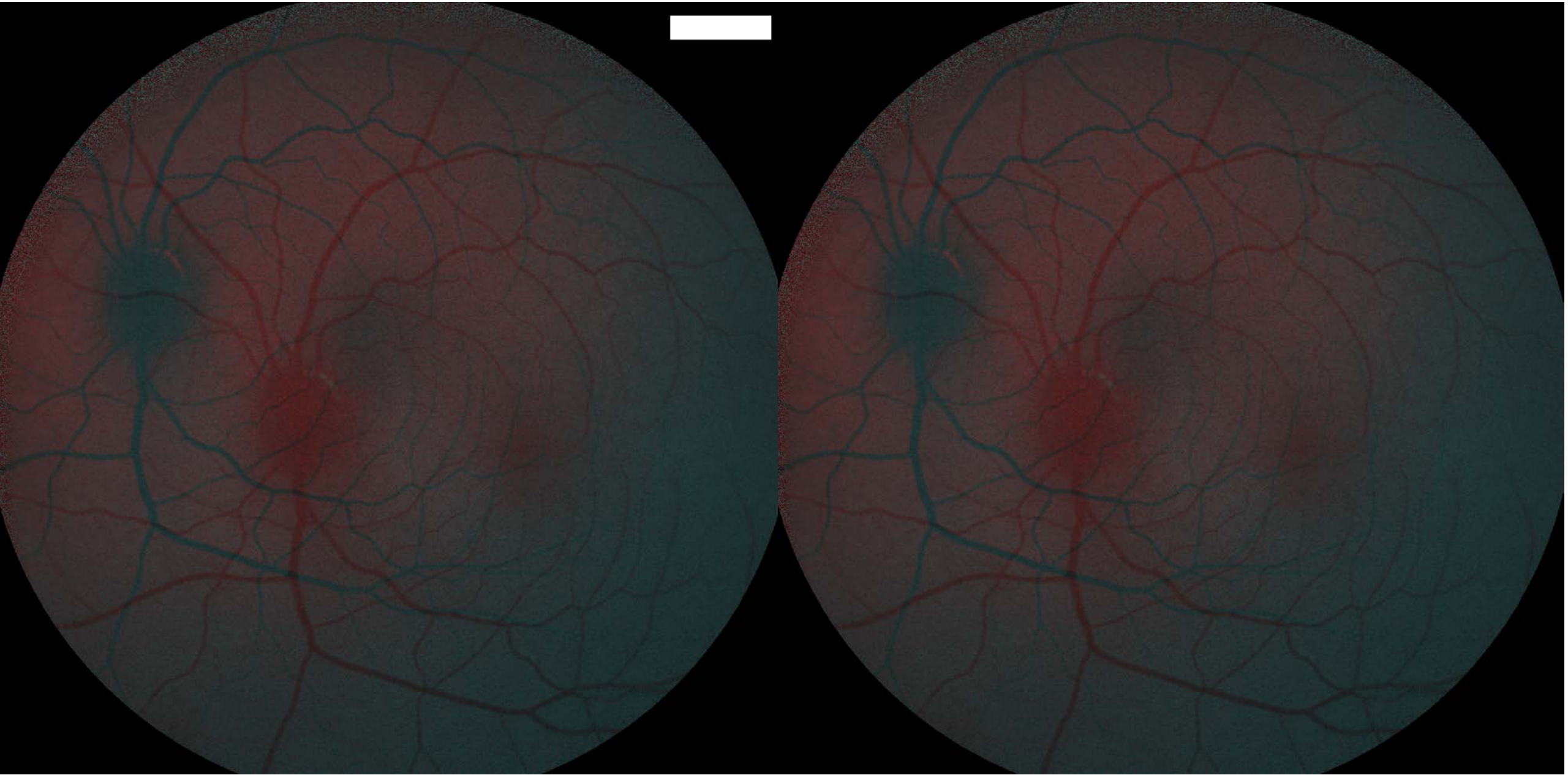


Cyno 191823 OS, V1 to V2 Post 5min, SIFT (L) & SURF(R) matches



Cyno 191823 OS, V1 to V2 Post 15min, SIFT (L) & SURF(R) matches

Putatively matched points (including outliers)



Cyno 191823 OS, V1 to V2 Post 30min, SIFT (L) & SURF(R) matches

Putatively matched points (including outliers)