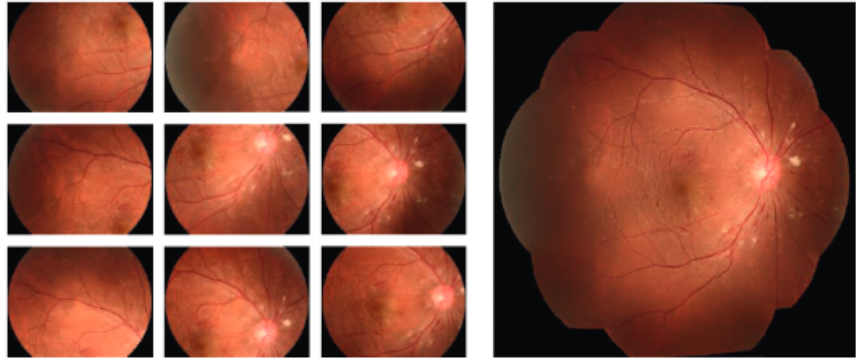


Retinal Imaging is a cost-effective way of assessing the integrity of the retina, in particular its blood irrigation. Due to limited field of view, it is common practice to acquire several images of the same retina while changing the position of the camera, resulting in a collection of images that the clinicians then assess [1].

Here we consider the particular case of premature retinal image analysis. Sight-threatening diseases like Retinopathy of Prematurity manifest through abnormal blood vessel growth in the first weeks of the baby's life [2]. In this case,

technicians also collect several images in order to allow ophthalmologists to examine all retinal vasculature. In this project, developed in collaboration with



clinicians from Hospital

Figure: Mosaic from retinal adult images

Sant Joan de Deu in Barcelona, we seek to develop a computer vision system that can stitch together this set of images into a single wide-field representation of the entire retina, to enable more effective clinical examination [3], as shown above.

Unfortunately, for obvious reasons, it is harder to acquire good-quality images in preterm babies than in collaborative adults. Other challenges in this project are the lack of manual annotations, or the variable number of images acquired per patient. Since image mosaicking can be partially viewed as iterative registration, we plan on applying/developing robust self-supervised image registration techniques to achieve our goals [4]. We expect image processing skills, and/or knowledge about image registration, image segmentation, and computer vision in general to prove useful in this problem.

[1] C. Hernandez-Matas et al., Retinal image registration as a tool for supporting clinical applications, CMPB 2021

[2] Chiang, M.F., et al.: International Classification of Retinopathy of Prematurity, 3rd Edition, Ophthalmology 2021.

[3] A. Pandey, U. Pati, Image mosaicing: A deeper insight, IVC, 2019

[4] B. de Vos et al., A deep learning framework for unsupervised affine and deformable image registration, MedIA 2019