

Retina Template Matching in Teleophthalmology

RetinaMatch is an efficient and accurate retinal matching technique that uses adapter-based optics in a smartphone and can lead to proper care and diagnoses for teleophthalmology. This technology offers high quality images to mitigate misdiagnoses and address the challenge of automated retinal image matching and registration.

What is the Problem?

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Teleophthalmology is an important component of telemedicine, and it is now the standard of care in linking patients in remote areas to ophthalmologists. Recently, low-cost teleophthalmology has been facilitated by smartphone-based fundus imaging. In addition, the emerging virtual and mixed reality sector may enable new teleophthalmology scenarios for long-term eye imaging and monitoring. However, in the case of portable fundus photography, non-mydratric image quality is more vulnerable to distortions, such as uneven illumination, noise, blur and low contrast. There is a need to address the challenging problem of automated retinal image matching and registration to enable future teleophthalmology applications.

What is the Solution?

The solution is an efficient and accurate retinal matching technique that combines dimension reduction and mutual information (MI), called RetinaMatch. The dimension reduction initializes the MI optimization as a coarse localization process, which narrows the optimization domain and avoids local optima. Retinal images are acquired by adapter-based optics attached to a smartphone, and can lead to high quality images that will lead to proper care and diagnoses.

What is the Competitive Advantage?

In the case of existing fundus photography technology, the image quality can be distorted, leading to misdiagnoses. This is the first template matching algorithm for retina images with small template images from unconstrained retinal areas. In the context of the emerging mixed reality market, automated retinal image matching and registration methods as transformative for advanced teleophthalmology and long-term retinal monitoring.

Patent Information:

Technology ID

BDP 8664

Category

Hardware/Machine Vision
Selection of Available
Technologies

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References

1. Chen Gong, N Benjamin Erichson, John P Kelly, Laura Trutoiu, Brian T Schowengerdt, Steven L Brunton, Eric J Seibel(43617) , <https://pubmed.ncbi.nlm.nih.gov/31217098/>, Trans Med Imaging