Comparison of two retinal tracking methods using infrared-reflectance (IR) fundus images

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Dynamic reference image update improves robustness of retinal tracking

METHODS

• Retinal tracking methods use fixed (Bagherinia et al, IOVS 2020, Vol.61, PB0060) or dynamic reference image during OCT acquisition.

• The tracking problem primarily consists of aligning the corresponding key points (KPs) as detected in a pair of images (reference and moving).

• The number and well-distributed KPs matches as well as the RMSE of matched KPs determine the robustness of the tracking.

• 500 IR images per scan (11.52x9.36 mm with a pixel size of 15 µm, a frame rate of 50Hz) of 12 subjects (a total of 68 scans) were captured using a prototype slit-scanning ophthalmoscope with normal and small pupil acquisition mode.

• 9 different patient fixations including central and peripheral fixations with different levels of eye motion and image quality were considered.

RESULTS

• Figure 2 shows the reported statistics for both tracking methods using a fixed and dynamic reference image.

• The mean values of the RMSE, the proportion of the image covered by the KPs, the number of KPs, and the number of frames tracked per acquisition were improved by 44%, 22%, 33%, and 8% respectively using the method based on the dynamic reference image update.

• The average execution time of both tracking methods were measured 15 ms using Intel i7-8850H CPU, 2.6 GHz, 32 GB RAM.

CONCLUSIONS

• We compared two real-time retinal tracking methods based on fixed and dynamic reference image update.

• We showed significant performance improvement of the retinal tracking using dynamic reference image update.

• Retinal tracking based on dynamic reference image update may improve the OCT acquisition workflow and robustness of the retinal tracking.