Segmentation guided registration of wide field-of-view retinal optical coherence tomography volumes

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Supplementary material

1. Registration results on test volumes

Subject 1



Fig. 1. Results for test Subject 1. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 2. Results of the axial registration, after lateral registration. X-direction of Subj. 1 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 3. Results of the axial registration (after lateral registration). Y-direction of Subj. 1 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.

Subject 2



Fig. 4. Results for test Subject 2. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 5. Results of the axial registration, after lateral registration. X-direction of Subj. 2 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 6. Results of the axial registration (after lateral registration). Y-direction of Subj. 2 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 7. Results for test Subject 3. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 8. Results of the axial registration, after lateral registration. X-direction of Subj. 3 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 9. Results of the axial registration (after lateral registration). Y-direction of Subj. 3 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 10. Results for test Subject 4. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 11. Results of the axial registration, after lateral registration. X-direction of Subj. 4 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 12. Results of the axial registration (after lateral registration). Y-direction of Subj. 4 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 13. Results for test Subject 5. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP.
(d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 14. Results of the axial registration, after lateral registration. X-direction of Subj. 5 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 15. Results of the axial registration (after lateral registration). Y-direction of Subj. 5 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 16. Results for test Subject 6. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 17. Results of the axial registration, after lateral registration. X-direction of Subj. 6 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 18. Results of the axial registration (after lateral registration). Y-direction of Subj. 6 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.

Subject 7



Fig. 19. Results for test Subject 7. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 20. Results of the axial registration, after lateral registration. X-direction of Subj. 7 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 21. Results of the axial registration (after lateral registration). Y-direction of Subj. 7 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 22. Results for test Subject 8. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 23. Results of the axial registration, after lateral registration. X-direction of Subj. 8 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 24. Results of the axial registration (after lateral registration). Y-direction of Subj. 8 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 25. Results for test Subject 9. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 26. Results of the axial registration, after lateral registration. X-direction of Subj. 9 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 27. Results of the axial registration (after lateral registration). Y-direction of Subj. 9 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 28. Results for test Subject 10. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 29. Results of the axial registration, after lateral registration. X-direction of Subj. 10 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 30. Results of the axial registration (after lateral registration). Y-direction of Subj. 10 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 31. Results for test Subject 11. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 32. Results of the axial registration, after lateral registration. X-direction of Subj. 11 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 33. Results of the axial registration (after lateral registration). Y-direction of Subj. 11 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 34. Results for test Subject 12. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 35. Results of the axial registration, after lateral registration. X-direction of Subj. 12 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 36. Results of the axial registration (after lateral registration). Y-direction of Subj. 12 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 37. Results for test Subject 13. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 38. Results of the axial registration, after lateral registration. X-direction of Subj. 13 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 39. Results of the axial registration (after lateral registration). Y-direction of Subj. 13 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 40. Results for test Subject 14. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 41. Results of the axial registration, after lateral registration. X-direction of Subj. 14 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 42. Results of the axial registration (after lateral registration). Y-direction of Subj. 14 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 43. Results for test Subject 15. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 44. Results of the axial registration, after lateral registration. X-direction of Subj. 15 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 45. Results of the axial registration (after lateral registration). Y-direction of Subj. 15 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 46. Results for test Subject 16. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 47. Results of the axial registration, after lateral registration. X-direction of Subj. 16 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 48. Results of the axial registration (after lateral registration). Y-direction of Subj. 16 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 49. Results for test Subject 17. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 50. Results of the axial registration, after lateral registration. X-direction of Subj. 17 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 51. Results of the axial registration (after lateral registration). Y-direction of Subj. 17 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 52. Results for test Subject 18. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 53. Results of the axial registration, after lateral registration. X-direction of Subj. 18 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 54. Results of the axial registration (after lateral registration). Y-direction of Subj. 18 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 55. Results for test Subject 19. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 56. Results of the axial registration, after lateral registration. X-direction of Subj. 19 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 57. Results of the axial registration (after lateral registration). Y-direction of Subj. 19 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 58. Results for test Subject 20. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 59. Results of the axial registration, after lateral registration. X-direction of Subj. 20 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 60. Results of the axial registration (after lateral registration). Y-direction of Subj. 20 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.

Subject 21



Fig. 61. Results for test Subject 21. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 62. Results of the axial registration, after lateral registration. X-direction of Subj. 21 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 63. Results of the axial registration (after lateral registration). Y-direction of Subj. 21 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.

Subject 22



Fig. 64. Results for test Subject 22. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 65. Results of the axial registration, after lateral registration. X-direction of Subj. 22 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 66. Results of the axial registration (after lateral registration). Y-direction of Subj. 22 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.

Subject 23



Fig. 67. Results for test Subject 23. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 68. Results of the axial registration, after lateral registration. X-direction of Subj. 23 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 69. Results of the axial registration (after lateral registration). Y-direction of Subj. 23 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.

Subject 24



Fig. 70. Results for test Subject 24. (a) X-fast SVP. (b) Y-fast SVP. (c) Corrected X-fast SVP. (d) Corrected Y-fast SVP. (e) Overlay of SVPs before correction. (f) Overlay of SVPs after correction.



Fig. 71. Results of the axial registration, after lateral registration. X-direction of Subj. 24 for positions y = 100, y = 300 and y = 500 (from top to bottom). From left to right: X-fast volume original B-scan (X-direction); cross-sectional image of the original Y-fast volume in X-direction at the same location (slow-scan direction); X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.



Fig. 72. Results of the axial registration (after lateral registration). Y-direction of Subj. 24 for positions x = 100, x = 300 and x = 500 (from top to bottom). From left to right: cross-sectional image of the original X-fast volume in Y-direction (slow-scan direction); B-scan of the original Y-fast volume (Y-direction) at the same location; X-fast after correction; Y-fast after correction. Black regions represent gaps in acquisition.