

# Performance evaluation of multi-retinal layer segmentation using SD-OCT



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Poster # 169 - A0578

## PURPOSE

In order to utilize the abundance of data generated by SD-OCT and to facilitate advances in diagnosis, analysis tools are required. Such analysis includes generation of retinal layer thickness maps and OCT enface images. We characterize an automated multi-retinal layer segmentation algorithm (MLS) for fast and reliable quantification of seven intra-retinal layer boundaries in retinal OCT images.

## METHODS

**Subjects:** 1) Normals; 2) Subjects with abnormalities (Age-related macular degeneration (AMD), Diabetic Retinopathy (DR), Vitreo-retinal interface abnormalities (VRI))

**Imaging system:** prototype SD-OCT

**Scan Type:** 3x3mm, 6x6mm, HD 6x6mm with 2mm scan depth, 8x8mm, HD 8x8mm, 12x12mm with 2.9mm scan depth.

**Data processing:** separating seven retinal layer boundaries scan (ILM, outer RNFL, outer IPL, outer INL, outer OPL, IS/OS, RPE) over five specified B-scan per OCT volume

**Data evaluation performed by:** 1) two human graders using EdgeSelect (a manual segmentation method) 2) MLS algorithm. Both segmentation results were evaluated by a clinician based on the clinical acceptance.

## RESULTS

290 B-scans were evaluated for each category (Normal: 75 B-scans; AMD: 55 B-scans, DR: 45 B-scans; other abnormalities: 60 B-scans).

Correlation plots and Bland Altman plots were generated and corresponding parameters (correlation coefficient and 95% confidence interval ( $\pm 1.96$  SD)) of Bland Altman plots were shown in figure 1 (manual vs manual) and figure 2 (average manual vs MLS) were reported for each layer boundary across 290 B-scans.

## CONCLUSION

Two graders showed strong correlation and good agreement using EdgeSelect (manual segmentation method). A high correlation and good agreement between average manual segmentation and MLS were also demonstrated, indicating the results from MLS is as accurate as the results from human graders.

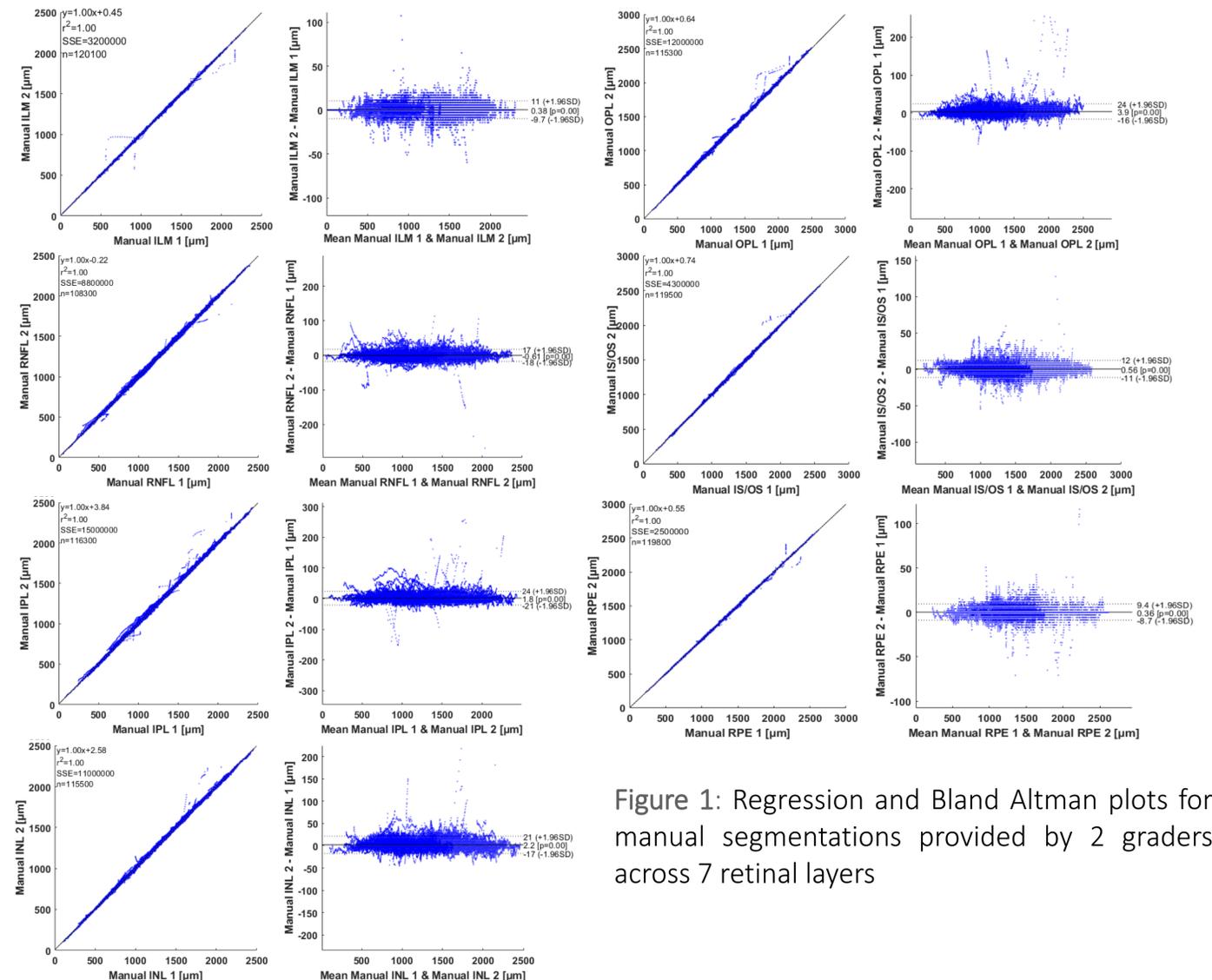


Figure 1: Regression and Bland Altman plots for manual segmentations provided by 2 graders across 7 retinal layers

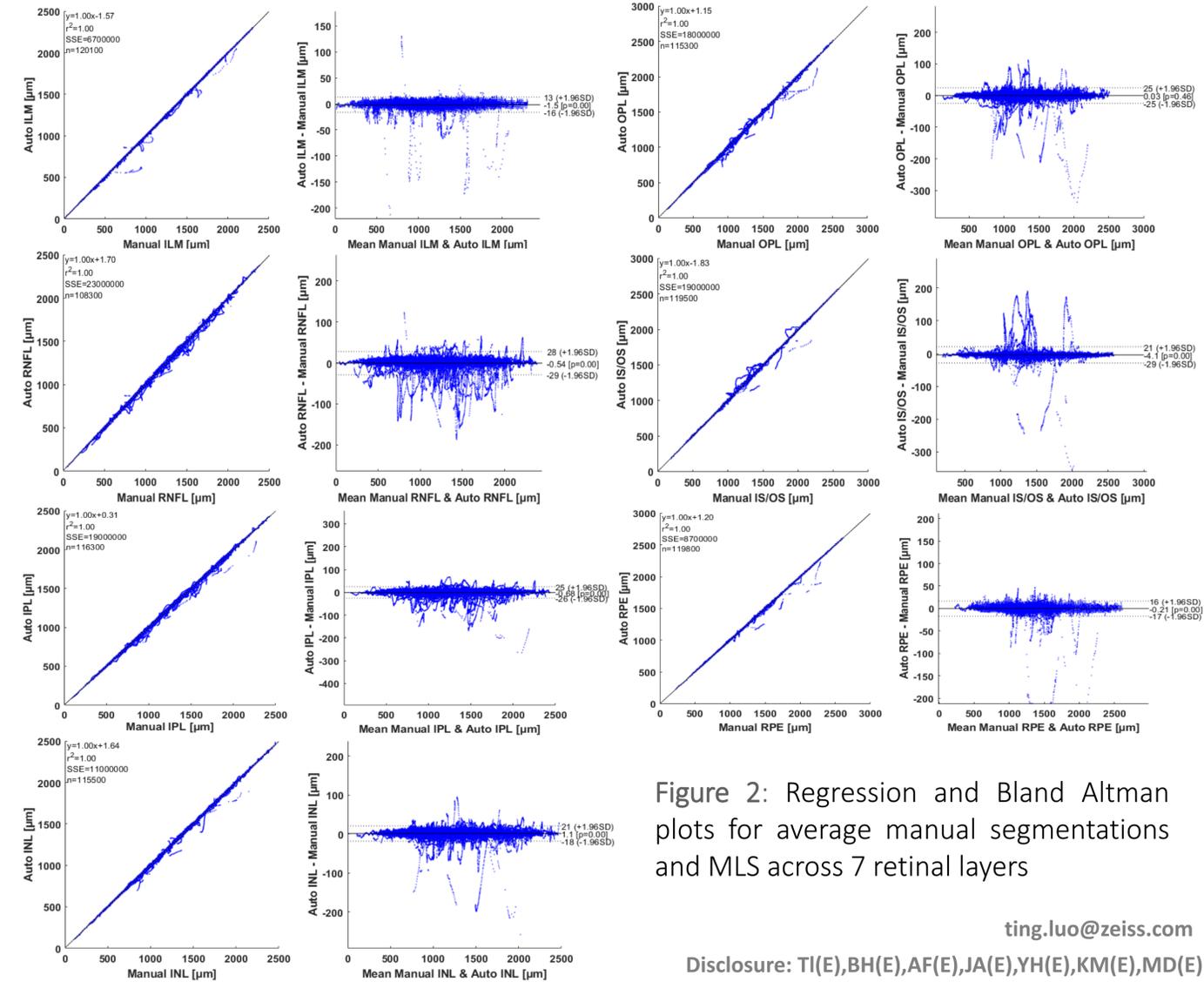


Figure 2: Regression and Bland Altman plots for average manual segmentations and MLS across 7 retinal layers