A-Eye: Towards a large-scale MRI-based model of the eye

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BACKGROUND

Why Magnetic Resonance Imaging (MRI) of the eye (MReye)?

- Superior soft tissue contrast penetration
- 3D image acquisition of the entire eye
- Useful in some pathologies and future treatment planning

Improvement with respect to previous work1-7:

- More ocular structures: lens, globe, optic nerve, fats, and muscles
- Large-scale
  - 1,200 non annotated subjects
  - 35 manually annotated subjects

METHODS

ATLAS-based registration

Deep Learning (DL) approach8-11

RESULTS

ATLAS vs DL: Similarity on 1200 subs

ATLAS vs DL: DSC on 4 same subjects with Ground Truth

ATLAS vs DL: Axial length

CONCLUSIONS

- First large-scale 3D MRI segmentation of lens, globe, optic nerve, fats, and muscles
- Key ophthalmic biomarkers can be automatically extracted

FUTURE WORK

- Deep learning accuracy improvement and baseline development (nnUNet13)
- Web interface design and development
- Automatic extraction of more biomarkers, and correlation with age, gender, BMI


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