INTRODUCTION

- Spatial normalization plays an essential role in the study of the human brain, particularly for assessing functional and structural changes across individuals.
- Commonly, experiments are designed to either a group template (e.g., MNI-152) or an individual template (e.g., SPM12). When using an individual template, there are several potential parameters to consider, such as the Posterioranterior (PA) position of the input template.

ATLAS CREATION METHODS

- Our atlas creation method involves using an iterative affine alignment to create a nonlinear atlas. This method combines the advantages of both affine and nonlinear methods, providing a more accurate template for brain region localization.
- The “Typical” brain was identified by calculating mean deformation distances pairwise and identifying the brain with the least deformation distance to every other brain.

ALTERNATIVE ATLAS CREATION TECHNIQUES: ITERATIVE AND TYPICAL METHODS

- In this section, we present three alternative methods for creating anatomical atlases: Iterative methods, Typical methods, and Nonlinear methods.
- Iterative methods involve iteratively aligning the template to the subject data, allowing for gradual refinement of the template.
- Typical methods use a single, idealized template that represents the average of all input templates.
- Nonlinear methods, such as the Haskins Pediatric Brain Atlas, provide a more accurate representation of the brain.

DATA COLLECTION

- Participants were selected from a cohort of children aged 7 to 12 years, with a group of 78 children and 76 adults.
- The data was collected using a Siemens 3T MRI scanner.

ATLAS EVALUATION

- The overlap metrics were computed to assess the accuracy of the atlas segmentation. The atlas evaluation was performed using a variety of metrics, including Dice Coefficient, Jaccard Index, and Overlap Metric.

REFERENCES


CONCLUSIONS

- We have introduced a novel pediatric template design for pediatric research, incorporating iterative and typical methods. This new atlas design provides a more accurate representation of the pediatric brain region than existing atlases.

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