

Abstract

The intent of this thesis is to evaluate the differences in facial morphology of children between 3 and 15 years of age based on 3D facial models and cross-sectional data. Due to improper use of cross-sectional data for studying growth, the next part of the thesis is focused on the comparison of cross-sectional and longitudinal approaches in research. The longitudinal observation of facial developmental changes can be considered as actual growth.

The cross-sectional database contains 839 3D facial models (397 boys, 442 girls). Three previously published longitudinal databases were used for comparison. Their age intervals were as follows: 3 to 6 years (12 boys, 14 girls), 6 to 12 years (15 boys, 18 girls), 12 to 15 years (23 boys, 22 girls). Geometric morphometric methods were used to analyse facial models (Coherent Point Drift – Dense Correspondance Analysis, Per Vertex T-Test and Principal Component Analysis). The results were visualized using superimposition colour maps, shell distance significance maps and their interlacing.

When annual consecutive age intervals were used for cross-sectional data, we could not observe the fluency of differences in facial morphology between age categories, which we can observe during actual growth. When wider age intervals were used for cross-sectional data, results were more visually similar to actual growth. The cross-sectional data was visually more similar to longitudinal data when the form was studied. This similarity is caused by size contamination, more than 88 % of total variance when studying form is responsible for age differences in size.

Key words: craniofacial growth, 3D facial models, cross-sectional data, longitudinal data, comparison of cross-sectional and longitudinal data, geometric morphometry