Morphometric data refers to quantitative measurements of the shape and size of organisms, objects, or biological features. These measurements are used to analyze and describe the form and structure of living organisms or inanimate objects. Morphometrics is commonly applied in various scientific disciplines, including biology, anthropology, paleontology, geology, and material science.

Here are some key points related to morphometric data:

Shape and Size Analysis: Morphometric data can be categorized into shape and size measurements. Size typically involves linear measurements (length, width, height) or volumetric measurements, while shape encompasses the relative proportions and configuration of different parts.

Landmarks and Outlines: Morphometric analyses often rely on the identification of specific anatomical landmarks or the digitization of outlines. Landmarks are specific points on a structure, while outlines involve tracing the contours of an object.

Two-Dimensional (2D) and Three-Dimensional (3D) Morphometrics: Morphometric analyses can be conducted in two or three dimensions. 2D morphometrics commonly involves the analysis of shapes from photographs or scanned images, while 3D morphometrics utilizes three-dimensional data obtained from techniques such as laser scanning or computed tomography (CT).

Geometric Morphometrics: This is a specific approach to morphometrics that uses geometric shapes and their coordinates to analyze and compare forms. Landmarks are often digitized, and statistical methods are employed to study shape variations.

Applications:

Biological Sciences: Morphometrics is used in evolutionary biology, ecology, and taxonomy to study variations in the form and structure of organisms. Paleontology: Fossil studies often involve morphometric analyses to understand evolutionary changes over time. Material Science: Morphometrics can be applied to study the shape and size of materials, such as grains or particles. Medical Imaging: In medical fields, morphometrics can be used to analyze the shape and size of organs, bones, and other anatomical structures. Software Tools: Various software tools and packages are available for conducting morphometric analyses, such as MorphoJ, tpsDig, and landmark-based software like MorphoStudio.

Morphometric data analysis allows researchers to quantify and compare the variations in form and structure, providing insights into evolutionary processes, ecological adaptations, or changes in biological systems over time.

Obtaining 3D craniofacial morphometric data is essential in a variety of medical and educational disciplines. Quispe-Enriquez et al. explored smartphone-based photogrammetry with photos and video recordings as an effective tool to create accurate and accessible metrics from head 3D models. The research involves the acquisition of craniofacial 3D models on both volunteers and head mannequins using a Samsung Galaxy S22 smartphone. For the photogrammetric processing, Agisoft Metashape v 1.7 and PhotoMeDAS software v 1.7 were used. The Academia 50 white-light scanner was used as reference data (ground truth). A comparison of the obtained 3D meshes was conducted, yielding the following results: 0.22 ± 1.29 mm for photogrammetry with camera photos, 0.47 ± 1.43 mm for videogrammetry with video frames, and 0.39 ± 1.02 mm for PhotoMeDAS. Similarly, anatomical points were measured and linear measurements extracted, yielding the following results: 0.75 mm for photogrammetry, 1 mm for videogrammetry, and 1.25 mm for PhotoMeDAS, despite

large differences found in data acquisition and processing time among the four approaches. This study suggests the possibility of integrating photogrammetry either with photos or with video frames and the use of PhotoMeDAS to obtain overall craniofacial 3D models with significant applications in the medical fields of neurosurgery and maxillofacial surgery [1)].

1)

Quispe-Enriquez OC, Valero-Lanzuela JJ, Lerma JL. Craniofacial 3D Morphometric Analysis with Smartphone-Based Photogrammetry. Sensors (Basel). 2023 Dec 30;24(1):230. doi: 10.3390/s24010230. PMID: 38203091.