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A new generation of three-dimensional anatomical atlases, obtained through a process of acquisition and combination of images coming from three different technologies

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The anatomical representation of the human body deals with a burden throughout the centuries: the gap between the iconographic representation and the real object. The drawings and the watercolour plates are schematizations, so they are deeply far from the real object, apart from the accuracy. The photographic images allow to fix the image of anatomical preparations with high fidelity to particulars, bypassing the aforesaid artistic representation by the author, but they are static. The modern virtual graphic synthesis images are three-dimensional, so they can be observed from every point of view, but they still remain schematizations influenced by the artistic representation of the graphic designer. Moreover, they lack real colour and real light. Nevertheless, it is possible to reduce the aforesaid gap to minimal levels through a process of acquisition and combination of anatomical images conceived by the first of the authors and protected by patent. The images are obtained from non-contact surface scanning, computerized tomography and high resolution photography. The non-contact surface scanning, made through laser scanner or structured-light scanner, generates a cloud of points of the surface of the examined object and each one is identified by specific coordinates. Starting from the cloud of points it is possible to reconstruct a three-dimensional model of the scanned surface, characterized by very high definition and measurable (accuracy of micron). The CT images allow to observe and to analyse in depth the object under examination, according to the sequential sagittal, frontal, or transverse planes. The scanned images can be processed through specific software, in order to obtain a 3D reconstruction, which offers a global three-dimensional overview of the anatomical structure. The object under examination can be photographed in controlled ambient light conditions, in order to obtain high resolution images. A scale superimposition of the three-dimensional model obtained from the non-contact surface scanning, of the 3D reconstruction from CT images, and of the high definition photos, leads to the complete finished model, observable both on the surface and in depth, which can work as an Anatomy Atlas if some hyperlinks are added in order to tag the anatomical details. In this case the observer has the opportunity of analysing not simple schematization, but a model made through an objective instrumental data acquisition process, not falsifiable, highly corresponding in colours, in light and in morphology, from the macroscopic aspect to the under-millimetre details, rotable, observable from every perspective and carefully measurable. Moreover, the finished product can be processed in order to be observed in 3D through virtual reality visors or augmented reality visors.

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Key words

Research Methods, Laser Scanner, Morphometry.