

CreaTools : a development framework for medical image processing software ; an application to segmentation, anomaly detection and quantification for coronary arteries

Authors	C. Mouton, E. E. Dávila Serrano, F. Cervenansky, S. Camarasu-Pop, E. Correa, L. Flórez-Valencia, M. Hernández Hoyos, and M. Orkisz
Conference Name	European BioImage Analysis Symposium 2013
Date Published	10/2013
Conference Location	IRB Barcelona, Spain
URL	http://eubias2013.irbbarcelona.org/meeting-report

CreaTools provides stand-alone applications for end users and a cross-platform framework that helps researchers in the validation of their medical image processing algorithms. As an open source platform initiated at CREATIS, it provides tools to quickly prototype an interface, choose a sophisticated visualization, add interactivity with the image and apply processing(s) to be tested. It has been applied to cardio-vascular studies, the analysis of maxillofacial bones, the segmentation of corals and the quantification of cerebral perfusion, visceral adipose tissue, pulmonary ventilation, etc. The basic elements, widgets (e.g. DICOM browser) or algorithms, are capitalized in black boxes, the kernel of CreaTools being BBTK (Black Box Tool Kit). These boxes are interconnected via heterogeneous C++ modules, in a pipeline mode, using a script language or a graphical interface. The boxes are based on the widely used open-source third-party libraries, ITK, VTK, wxWidgets and Qt. Recently, a new tool has been developed to help new users, CreaDevManager. CMake use is now transparent and a graphical interface is provided to guide the developer.

CreaTools is not only suitable for quick prototyping but also can be used to design final applications, the final user being a researcher or a medical doctor. For example, CreaCoro is a CreaTools interface aiming at the visualization of anomalies in coronary arteries. Based on an input axis and an image, it extracts the vessel, produces a linear view of it (CPR), allowing to see the lumen slice by slice. Several segmentation, anomaly detection and quantification algorithms have been tested thanks to this interface. Their results can be visualized by superposition on the input image. This gives a feedback on the algorithm accuracy towards the detection of the anomaly, its quantification and the lumen segmentation, by comparison on the 3D, axial and CPR views.