AnToNIa: A Software Tool for the Hemodynamic Analysis of Cerebral Vascular Malformations Using 3D and 4D MRA Image Sequences

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Stroke is the second most common cause of death and major cause of disability world-wide. Approx. 20% of cerebral strokes are caused by hemorrhages due to rupture of cerebral vascular diseases like aneurysms or arteriovenous malformations. In case of an early diagnosed cerebral vascular disease an exact knowledge of the individual anatomy and hemodynamic situation is needed for an improved rating of the disease and therapy planning. New 3D and 4D MRA imaging techniques can improve the diagnostic possibilities while reducing the risk for the patient at the same time. The combined analysis and visualization of these image sequences for the diagnosis of vascular malformations pose new complex and special requirements, which are not met by established neuro imaging software tools so far. In this paper a new software tool named AnToNIa (Analysis Tool for Neuro Imaging Data) for the analysis of cerebral hemodynamics based on 3D and 4D MRA image sequences is presented. Within this scope methods for the segmentation and combined analysis and visualization of 3D and 4D MRA datasets are described. In a first in-house trial by clinicians AnToNIa was rated to provide the opportunity for improved clinical diagnostics of cerebral malformations.
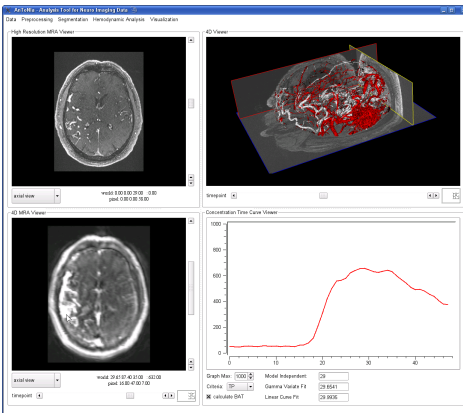
Figure 1: The Graphical User Interface of An-ToNIa: Slice viewer for 3D (top left) and 4D MRA image sequences (bottom left), concentration time curve viewer with bolus arrival time estimation (bottom right) and dynamic 4D blood flow viewer (top right)