

This thesis focuses on the processing of CT data received during the CT examination of the vessels — CT angiography. The area of interest is the extracranial course of the carotid arteries. Regarding the major role of these vessels in the blood supply of the brain cells this examination is frequently performed and influences the diagnostic decision and following therapy in case of pathological changes of the vessels.

The contemporary clinical software included in the tomographs does not provide sufficient comfort for easy 3-dimensional orientation which is necessary for the diagnostics. The automatic segmentation and classification of the vessels might be a possible solution to this problem and also a great challenge. For the segmentation of the extracranial part of the carotid arteries the parallel and robust model fitting algorithm was used. The parameters of the model make it possible to classify the vessel and to draw attention to its stenosis, for example. The algorithm was tested on both synthetic and real data. The core of the system is implemented as a set of separate ITK filters. It exploits all the advantages of the software architecture of the ITK framework (object-oriented design, parallel and stream data processing, multiplatform, reusable components). The user friendliness is ensured by the Windows Forms of .NET framework.