

## Investigations of Tubular Structures

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Today's digital imaging modalities in Radiology enable computer postprocessing. Infrarenal aortic aneurysms, meaning the abnormal extension of the main abdominal blood vessel, represents a potential life threatening medical condition. Since various therapeutic options are available today, reliable prognostic parameters have to be obtained.

The aim of this paper is to demonstrate how advanced image processing can be applied to Spiral-CT data of patients with infrarenal aortic aneurysms in order to provide a basis for further medical management.

**Algorithm:** In the method presented in this paper at first the tubular structure of the aorta is extracted semiautomatically into an image sequence. Then a thinning algorithm is performed to get the skeleton. The user can decide the main path of the skeleton by using a 3D virtual reality environment. This path is smoothed and equidistant slices that are orthogonal to the path are extracted from the original object. The crosssectional area of each slices are calculated and maximal diameters are estimated. These results are exported into diagrams for further treatment planning.

**Software:** In this project in-house 3D thinning algorithms were used. 3D pathes are stored in a 3D chain code format. A VRML editor utility CosmoWolrds and self made conversion tools converting from chain code to VRML and vice versa were used. Possible pathes in the skeleton were found by the help of graph algorithms. Path was smoothed with vector smoothing algorithm. Orthogonal slices were extracted and measurements were performed within the IDL (Interactive Data Language from Creaso Research Systems, USA) environment.

The results showed that the maximal diameter and crosssectional area describes well the state of the blood vessel.