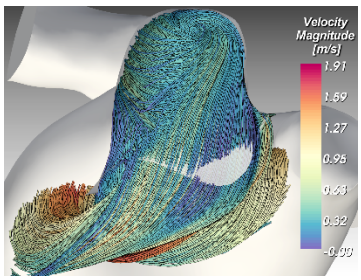
OTTO VON GUERICKE UNIVERSITÄT MAGDEBURG

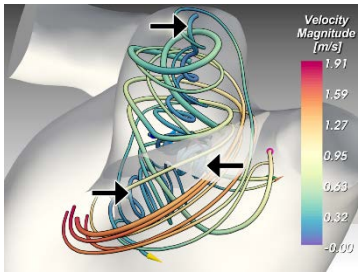
MEDIZINISCHE FAKULTÄT
UNIVERSITÄTSKLINIKUM MAGDEBURG A.Ö.R.

MedDigit

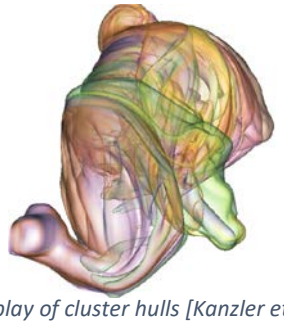
Aviz
Visual Analytics Project



Full set of integral curves.

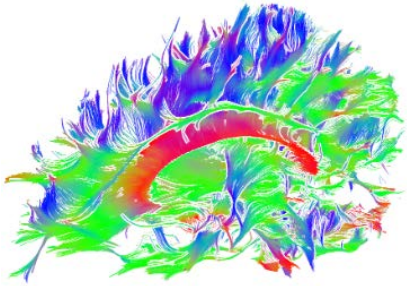


Similar curves have been grouped and one representative curve per group is shown.



Display of cluster hulls [Kanzler et al.]

Uncontracted fiber tracts [Everts et al.]



Contracted fiber tracts [Everts et al.]

We offer an interdisciplinary
Master thesis
in the field of „Interactive Blood Flow Exploration"

Cerebral aneurysms are pathological dilations of cerebral vasculature and their rupture is associated with fatal consequences. Since interventional aneurysm treatment also involves the risk of causing an internal bleeding, a detailed risk estimation and a deeper insight into the blood flow dynamics are crucial. In research, CFD simulations allow us to gain a better understanding of the dynamics of the flow. The simulated blood flow is often visualized using integral curves resulting in cluttered "spaghetti plots". Advanced approaches group similar curves and show only representative curves. These approaches however, fail in showing the clusters' spatial extent. Showing multiple semi-transparent cluster hulls addresses this drawback but the result is hard to interpret [1].

[1] Kanzler et al., Interactive Visual Exploration of Line Clusters, In: Proc. of VMV, 2018.

In this thesis, an interactive approach facilitating a continuous transition between the full set of integral curves and an uncluttered abstracted visualization shall be developed. Browsing through various levels of abstraction shall allow the user to grasp both, the general structure of the blood flow pattern as well as the spatial extent of individual substructures. The new approach shall be based on the work of Everts et al. [2] in fiber tract exploration. The work will be conducted at the Dept. of Simulation and Graphics, OVGU (Bernhard Preim) in a tight collaboration with the Dept. of Neurology, OVGU (Steffen Oeltze-Jafra) and Inria, France (Tobias Isenberg).

[2] Everts et al., Exploration of the Brain's White Matter Structure through Visual Abstraction and Multi-Scale Local Fiber Tract Contraction. IEEE Trans Vis Comput Graph, 21(7):808–821, 2015.

We offer:

- participation in cutting-edge, clinically relevant research
- cooperation with clinical partners, joint publication of results
- assistance and approachable supervision with thesis implementation und writing
- pleasant and supportive atmosphere

We expect:

- motivation, creativity and team spirit
- good to excellent programming knowledge (C++)
- very good study achievements (CV, Computer Science, Math, …)

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Bachelor/Master thesis MedDigit yannic.waerzeggers@med.ovgu.de

Bachelor/Master thesis MedDigit yannic.waerzeggers@med.ovgu.de

Bachelor/Masterar thesis MedDigit yannic.waerzeggers@med.ovgu.de

Bachelor/Master thesis MedDigit yannic.waerzeggers@med.ovgu.de

Bachelor/Master thesis MedDigit yannic.waerzeggers@med.ovgu.de

Bachelor/Master thesis MedDigit yannic.waerzeggers@med.ovgu.de

Bachelor/Master thesis MedDigit yannic.waerzeggers@med.ovgu.de