| Module name: | **Visualization Techniques** |
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| **Abbreviation:** | VIS |
| **Study semester:** | 2$^{nd}$ semester (SS), frequency: once a year |
| **Responsible for module:** | Volker Ahlers |
| **Teaching staff:** | Volker Ahlers, Frauke Sprengel |
| **Language:** | German or English |
| **Place in curriculum:** | Master, Compulsory subject, 2$^{nd}$ semester |
| **Teaching methods/SWS:** | 2 SWS lecture with approx. 30 students<br>2 SWS exercise with approx. 15 students |
| **Work required:** | Lecture = 34 h<br>Exercise = 34 h<br>Own study time = 112 h |
| **Credit points:** | 6 CP (= 180 h) |
| **Prerequisites acc. to exam regulations:** | None |
| **Recommended prerequisites:** | Computer Vision |
| **Learning goals:** | Algorithmic and mathematical skills: Knowledge of the basic principles of human-computer interaction (HCI); understanding of visualization algorithms; knowledge of different types of data representation; critical assessment of visualizations.<br>Analysis, design and realization skills: Analysis of data sets and visualization requirements; design and realization of visualization solutions.<br>Technological skills: Knowledge of the use of visualization techniques in different areas of application<br>Methodological skills: Knowledge of the opportunities, the benefits and the limits of the use of visualization techniques |
| **Contents:** | Techniques used to visualize numerical and abstract data<br>Basic principles: Visual perception, human-computer interaction (HCI), color models, data representation, visualization pipeline, applications<br>Scalar data: Line, bar and pie graphs, color coding, contour lines, altitude profiles<br>Vector fields: Glyphs, warping, flow lines, flow paths<br>Volume data: Isosurfaces, volume rendering, ray casting, splatting<br>Information visualization: Mapping abstract data and relationships, graph drawing<br>Visualization software: Current library and graphical development environments, use of real data |
| **Examinations:** | Examination (written or oral examination) and experimental work |
| **Media forms:** | Lecture: Presentation, board, examples, discussion<br>Exercise: Independent task-solving in groups of 2, project work with presentation, assessment and discussion of solutions |
| **Literature:** | Lecture notes<br>Telea, A.C.: Data Visualization. A K Peters, latest edition.<br>Hansen, C.D., C.R. Johnson (Hg.): The Visualization Handbook. Elsevier Butterworth-Heinemann, latest edition. |