OST Ostschweizer Fachhochschule

MSE | MASTER OF SCIENCE IN ENGINEERING

Modulbeschrieb

Shape Data Analysis

Allgemeine Angaben

Modulbezeichnung

Shape Data Analysis

Modulkategorie

Fachliche Vertiefung

Anzahl der Credits

3

Modulverantwortliche/r

Hans Fritz; hans.fritz@ost.ch

Durchführungssetting

Campus	☐ Buchs	x Rapperswil-Jona	☐ St. Gallen
Online Teilnahme	x keine Onlineteilnahme möglich	☐ hybrid	☐ ausschliesslich online
Durchführung	☐ wöchentlich	☐ als Blockwoche	x nach Absprache

Ziele, Inhalt und Methoden

Lernziele, zu erwerbende Kompetenzen

- Understanding the importance of shape analysis
- Knowing different application areas of shape data analysis
- Understanding concepts of Riemannian Geometry
- Knowing selected techniques of shape data analysis

Modulinhalt

Think of several images showing the same object, but slightly differ from each other, e.g. images of human kidneys in computational anatomy, where the images differ due to patient movement during image acquisition. How could one average such images without destroying the shape? Whereas computing the average of a dataset is usually the most basic statistical problem, this task becomes challenging when the elements of the dataset are shapes. A similar question is, how to interpolate between different shapes? In this course, we want to study such questions, which are highly relevant in such diverse fields as computer graphics, medicine, and biology. Concepts of Riemannian Geometry will be learned during the course.

Lehr- und Lernmethoden

- Self-study of selected book chapters and papers (**literature will be in English**)
- Preparation of one lesson with the support of the lecturer
- Presentation of a selected topic in one lesson (**talks will be in German**)
- Writing of a 1-2 pages summary of the presentation

Voraussetzungen, Vorkenntnisse, Eingangskompetenzen

- Multidimensional Analysis
- Linear Algebra
- Statistics
- Algorithmic thinking

Bibliografie

- Anuj Srivastava, Eric Klassen: Functional and Shape Data Analysis, Springer (2016).
- Martin Kilian, Niloy Mitra, Helmut Pottmann: *Geometric Modeling in Shape Space,* ACM Transactions on Graphics (2007).
- Nicolas Charon, Laurent Younes: Shape Spaces: From geometry to biological plausibility, arXiv:2205.01237v1 (2022)

Leistungsbewertung

Prüfungsart:

Seminar talk of approximately 90 minutes (**in German**), 1-2 pages summary (**in English**)

Zulassungsbedingungen

Active participation in the course (presence on course dates)

Prüfungsdauer

90 minutes (Presentations)

Hilfsmittel

Open book