

A U S H A N G

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

D I S P U T A T I O N

Montag, 14. November 2022, 10:00 Uhr

Ort: Seminarraum (EG Rundbau)
(ZIB, Takustr.7, 14195 Berlin)

Disputation über die Doktorarbeit von

Herrn Felix Paul Ambellan

Thema der Dissertation:

**Efficient Riemannian Statistical Shape Analysis
with Applications in Disease Assessment**

Thema der Disputation:

**Principal Geodesic Analysis and the Riemannian Exponential
in Lie Groups**

Die Arbeit wurde unter der Betreuung von **Prof. Dr. C. Schütte** durchgeführt.

Abstract: Assessment of variability within (finite) sets of data is an essential task in data science. One of the common, if not the most common approach to this is Principal Component Analysis (PCA), i.e. the characterization of variability as deviation from the sample mean by main trends. However, from a Riemannian point of view PCA is tailored to the flat Euclidean space calling for manifold-valued generalizations. In this talk we want to discuss Principal Geodesic Analysis (PGA) including the notion of Fréchet mean as a generalization of PCA to manifolds. PGA is subject to certain restrictions when brought into application, as the involved Riemannian exponential map in general does not allow for closed-form evaluation, hence, resorting to algorithmical approximations is necessary. Moreover, existence and uniqueness of respective solutions are not always guaranteed. These problems can be substantially alleviated if we restrict our considerations to Lie groups, especially matrix groups that admit bi-invariant metrics.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

Interessierte werden hiermit herzlich eingeladen

Der Vorsitzende der Promotionskommission
Prof. Dr. C. Schütte