

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

Donnerstag, 18. April 2024, 15:00 Uhr

Ort: Raum K40

(Fachbereich Mathematik und Informatik, Takustr. 9, 14195 Berlin)

Disputation über die Doktorarbeit von

Benjamin Wild

Thema der Dissertation:

Individuality in the hive A Data-Driven Study of Individual and Collective Behavior

Thema der Disputation:

Decoding the Language of Life: Machine Learning and Biological Systems

Die Arbeit wurde unter der Betreuung von **Prof. Dr. T. Landgraf** durchgeführt.

Abstract: Our understanding of biological systems is rapidly advancing through new methodological developments. In the first talk, I will demonstrate the role of machine learning in enhancing our understanding of these systems. I will explore how recent breakthroughs in autoregressive language models are being adapted to the fundamental languages of biology: DNA, RNA, and proteins. This talk will clarify the basics of autoregressive language models using deep learning and outline the methodological progress required to apply these models to DNA sequences.

In the subsequent talk, I will discuss how combining automated tracking technologies with machine learning techniques enhances our understanding of complex behaviors within social groups. Using honey bee colonies as a model system, I will describe how large-scale datasets of social interactions enable the analysis of how individual behaviors contribute to the emergence of a group's collective behavior. I will introduce a new descriptor, "network age," derived from the spectral decomposition of social interaction networks, which effectively predicts future behavior and task allocation of the individuals. It offers insights into the developmental pathways of bees and their contributions to colony function through detailed behavioral analysis over their lifetimes.

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. T. Landgraf