

A U S H A N G

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

DISPUTATION

Dienstag, 25. Oktober 2022, 11:00 Uhr

Ort: Seminarraum

(Zuse Institut Berlin, Takustr. 7, 14195 Berlin)

Disputation über die Doktorarbeit von

Frau Mona Milena Rams

Thema der Dissertation:

**New approaches for unsupervised transcriptomic data analysis
based on Dictionary learning**

Thema der Disputation:

**Trajectory inference from single-cell transcriptomic data with
Slingshot**

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

Abstract: Many biomolecular processes are dynamic, for example, cellular differentiation or response programs. In order to understand the molecular changes within a cell during such a dynamic process, we would ideally analyse samples from a cell over time. However, this is not possible when a large number of molecules is investigated. The reason for this is that the cell has to be lysed in order to obtain the desired molecular profile, for example, a transcriptomic profile. As a consequence of lysis, the cell dies and the dynamic process stops. To draw data from dynamic biomolecular processes nevertheless, single-cell sequencing data from multiple cells in a dynamic process can be investigated. In the data analysis, it is assumed that each profiled cell is at a different stage of the dynamic process. Yet, these stages are unknown. So-called 'pseudotime estimation' or 'trajectory inference' methods aim at determining the temporal ordering of the analysed cells within the dynamic process. Slingshot [1] is a widely applied pseudotime estimation method for single-cell transcriptomic data. In a highly cited benchmark study by Saelens et al. [2], Slingshot reaches the best overall score compared to 44 other pseudotime estimation methods. Notably, Slingshot can determine trajectories which involve branching. This occurs, for example, when one cell differentiates into different cell types. In my talk, I will present details of Slingshot as well as a recent application example published in Nature Medicine [3].

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. Conrad