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

Dienstag, 11. Februar 2025, 14:00 Uhr

Ort: Hörsaal 001

(Fachbereich Mathematik und Informatik, Arnimallee 3, 14195 Berlin)

Disputation über die Doktorarbeit von

Zeba Sultana

Thema der Dissertation:

Modeling the impact of double X-dosage on signaling pathways implicated in pluripotency

Thema der Disputation:

Methods for Network Inference in Biology

Die Arbeit wurde unter der Betreuung von **Prof. Dr. M. Vingron** durchgeführt.

Abstract: Biological systems are governed by complex interactions between various molecular components, which can be represented as networks. These networks play crucial roles in controlling cellular processes and maintaining homeostasis. Therefore, inferring such networks from experimental data has been a subject of extensive research. My presentation will begin with an overview of various types of networks in biology followed by different approaches employed for network inference and reconstruction. These include methods based on measures of expression similarity in omics data, such as correlation, mutual information etc., and those based on ordinary differential equations (ODE) or Boolean modeling. Next, a specific correlation-based method, Weighted Gene Co-expression Network Analysis (WGCNA) will be discussed highlighting its principles and presenting an example of its application. The latter part of the presentation will introduce Modular Response Analysis (MRA), a network inference methodology that enables the reconstruction of biological networks by analyzing their responses to systematic perturbations of individual nodes. MRA provides a framework for inferring the direction, activatory/inhibitory nature, and strength of local connections between nodes by examining the global responses of the network to a series of targeted perturbations. A maximum likelihood implementation of MRA has been used in my dissertation to investigate the impact of double X-chromosome dosage on the maintenance of pluripotency and initiation of differentiation in mouse embryonic stem cells (mESCs), which will be discussed in the following presentation.

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. M. Vingron