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, 22. September 2026, 14:00 Uhr

Ort: Seminarraum 006

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

Disputation über die Doktorarbeit von

Rosaria Tornisiello

Thema der Dissertation:

Leveraging single-cell RNA sequencing to dissect mammalian development and mutant phenotypes

Thema der Disputation:

Hidden Markov Models and their applications in Biology

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

Abstract: Hidden Markov Models (HMMs) provide a probabilistic approach for modeling sequential data that is generated by an unobserved Markovian process. This is achieved by combining a hidden state sequence, controlled by transition probabilities, with an observable emission component. HMMs define three canonical problems: calculating the probability of an observed sequence, decoding the most probable underlying sequence of states, and learning the model parameters from data. These three problems are addressed by the Forward, Viterbi, and Baum-Welch algorithms, respectively. HMMs have become a fundamental tool in bioinformatics whenever a biological sequence can be modeled as resulting from a hidden, spatially continuous process: for instance, in predicting gene structure and in detecting protein homology, as well as in segmenting the genome into functional chromatin states on the basis of combinatorial epigenomic signals, as implemented in the widely used tool ChromHMM. The talk begins by outlining the theoretical basis of HMMs and then looks at their application to the analysis of genomic and epigenomic sequences, before moving on to their extension to a new problem: the reconstruction of chromosome-scale genotypes from single-cell transcriptomic data.

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