

FREIE UNIVERSITÄT BERLIN

Fachbereich Mathematik und Informatik

Promotionsbüro, Arnimallee 14, 14195 Berlin

D I S P U T A T I O N

Donnerstag, 21. Januar 2021, 14:00 Uhr

Ort: [WebEx](#)

Disputation über die Doktorarbeit von

Frau Gal Barel

Thema der Dissertation:

**Network Propagation with Node Core for Genotype-Phenotype
Associations and Module Identification**

Thema der Disputation:

Random Walks on Graphs

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

Abstract:

A random walk is a stochastic process where a walker completes a path which is series of random steps in some space. The term random walk was first introduced by Karl Pearson in 1905, and by now it is used as a fundamental model for stochastic processes in many fields.

In the first part of the disputation I will introduce the mathematical foundation of random walks. I will focus on one common variant which is the random walk on a graph.

A random walk on a graph is a special case of a Markov chain. I therefore define the random walk using the graph topology and describe the properties corresponding to a Markov chain. The random walk is guaranteed, under certain conditions, to converge by the Perron-Frobenius theorem. I will therefore present the steady-state at the convergence and the equilibrium distribution that is reached. As an example for the application of the random walk model on a graph I will describe the PageRank algorithm which provides a ranking for the pages of the World Wide Web. Finally I will discuss the random walk with restart variant and its application to protein-protein interaction networks in the aim of addressing biological questions such a protein function prediction or disease association.

The second part of the disputation is dedicated to the content of the dissertation.

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