A U S H A N G

FREIE UNIVERSITÄT BERLIN
Fachbereich Mathematik und Informatik

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D I S P U T A T I O N

Freitag, 11. Dezember 2020, 13:30 Uhr

Ort: WebEx

Disputation über die Doktorarbeit von

Herrn Stefan Budach

Thema der Dissertation:

Explainable deep learning models for biological sequence classification

Thema der Disputation:

Interpreting Convolutional Neural Networks

Die Arbeit wurde unter der Betreuung von **Prof. Dr. A. Marsico** durchgeführt.

Abstract:
Machine learning algorithms have become indispensable tools for making sense of the ever-growing amount of genome-wide biological sequence data generated via sequencing experiments. In recent years, artificial neural networks and especially convolutional neural networks (CNNs) have experienced a resurgence in popularity and shown widespread adoption for classification and feature extraction tasks in a variety of scientific domains, including computer vision, natural language processing and bioinformatics. CNNs have proven to be powerful classifiers, however, this success has also sparked increasing research into their interpretability (or lack thereof). In this talk, I will briefly introduce the concepts of CNNs on the example of image data and I will show how they can be extended to allow application to biological sequence data. Afterwards, I will discuss how seemingly well-performing networks can fail and how interpretation methods can help uncover issues as early as possible. The talk will cover and compare advantages and disadvantages of two broad categories of methods: 1) attribution methods, such as saliency maps and integrated gradients, that focus on an individual input sample and try to explain its prediction by scoring input features and 2) feature visualization methods, such as direct kernel visualization and activation maximization, that focus on the network instead and try to explain what kind of input different kernels and layers react to.

Die Disputation besteht aus dem o. g. Vortrag, danach der Vorstellung der Dissertation einschließlich jeweils anschließenden Aussprachen.

Interessierte werden hiermit herzlich eingeladen

Die Vorsitzende der Promotionskommission
Prof. Dr. A. Marsico