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

Freitag, 19. August 2016, 15.00 Uhr

Ort: Seminarraum ZIB, Takustr. 7, 14195 Berlin

Disputation über die Doktorarbeit von

Herrn Paul Seiferth

Thema der Dissertation:

Disk Intersection Graphs: Models, Data Structures, and Algorithms

Thema der Disputation:

Conditional Lower Bounds for Computing the Fréchet Distance

Die Arbeit wurde unter der Betreuung von **Prof. Dr. W. Mulzer** durchgeführt.

Abstract: The Fréchet distance constitutes one of the most useful similarity measures between curves. It was introduced to the computational geometry community by Alt and Godau in their seminal paper from 1992 [SoCG'92], where they presented an algorithm that computes the Fréchet distance between two polygonal curves in the plane in time O(n^2 log(n)) (where n denotes the number of vertices on each curve). This algorithm remained the state of the art solution for more than 20 years until in 2013 Agarwal, Avraham, Kaplan, and Sharir [SODA'13] managed to break the quadratic bound for the discrete version, a popular variant of the continuous Fréchet distance as considered by Alt and Godau. Based on their work, Buchin, Buchin, Meulemans, and Mulzer [SODA'14] presented shortly later (in 2014) a slight improvement on the classical algorithm of Alt and Godau. However, none of the algorithms where strongly subquadratic, i.e., they still have running times Omega(n^2/polylog(n)), and it remained a notorious open question if strongly subquadratic algorithms exist.

Later in 2014, Bringmann essentially settled this question by showing that there cannot be a strongly subquadratic algorithm to compute the (continuous or discrete) Fréchet distance unless the Strong Exponential Time Hypothesis (SETH) fails [FOCS'14]. More precisely, if there is an algorithm that computes the Fréchet distance in time O(n^(2-delta)) for some constant delta > 0, then we can solve CNF-SAT in time O(2^((1-delta)N)), where N is the number of variables. The latter is considered to be very unlikely.

In this talk we will sketch the reduction of Bringmann that relates the discrete Fréchet distance to SETH. Furthermore, we will discuss several extensions such as the continuous case, non-approximability, and imbalanced curves where the number of vertices differ.

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. W. Mulzer