Doctorate School PLUS

uni-salzburg.at/doktorat

PARIS LODRON UNIVERSITÄT SALZBURG

MARS

Models, Algorithms, Computers and Systems

Series of Talks
WS 2025/26

Start: 11 am

Location: Lecture Hall T02
Jakob-Haringer-Straße 2

Department of Mathematics
Department of Computer Science

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PARIS LODRON UNIVERSITÄT SALZBURG | Mathematics

PARIS LODRON UNIVERSITÄT SALZBURG | Computer Science

MARS – Models, Algorithms, Computers, and Systems

Modern high tech research in science and technology requires to a great extent an interdisciplinary approach. This applies particularly to wide areas of the methodological sciences mathematics and computer science, where generally one or more aspects of a chain of consecutive closely interlocked fields of research are considered. These start with a mathematical model, continue with algorithmic problems and finally cover aspects of the implementation on computers or high performance computing environments and therefore also issues on the efficiency of computer systems.

MARS is a doctoral programme at the Doctorate School PLUS (DSP Programme), which is organized by the departments of mathematics and computer sciences of the Paris Lodron University Salzburg. Its objective is to educate doctoral students in the research fields models, algorithms, computers, and systems and also to achieve new insights and research findings especially with regard to the inter-dependency of these fields of research. The focus will be on important topics relevant for the Salzburg research site. MARS fields of research form particularly from a methodological point a cohesive and closely linked line of research and cover a wide spectrum of scientific interests.

Joint activities constitute the structured doctoral program in MARS. These include seminars with external guest speakers, one day workshops with external guests and multi day retreats away from the university, as well as summer schools on the topics of MARS.

Program

November 18, 2025
Thursday, 11:00 am
Lecture Hall T02, 2nd floor

Dimension Reduction Beyond Euclidean Geometry
Chengyuan Deng (Rutgers University)

Dimension Reduction aims to represent data with significantly shorter vectors, while preserving certain inherent properties of the data. Under Euclidean geometry, a few classical techniques have been well-studied, such as Principal Component Analysis (PCA), Multidimensional Scaling (MDS) and the Johnson-Lindenstrauss (JL) Lemma. However, modern applications handle data with various dissimilarity measures, which may not lie in Euclidean space.

In this talk, I will share our recent works on extending JL Lemma and MDS to a general Non-Euclidean setting: we only require the dissimilarity measure to be symmetric and reflexive. Note that this setting allows violation of triangle inequality, therefore also considers the non-metric cases. Indeed, the geometry can be very different from Euclidean, but our results show the extension is possible and certain optimality can be achieved. This direction is widely open, I will end with a slightly longer discussion of open questions.

Coming...

Ernst Rank (Munich TUM)
January 22, 2025