

# Topics in Low-Rank Factorization and Data Analysis

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## Synopsis

Identifying the underlying structure of a data set and extracting meaningful information is a key problem in data analysis and this course proposes some simple and powerful methods to achieve this goal, the low-rank matrix approximations algorithms, including randomized SVD, robust PCA and spectral clustering, providing us with the tools to uncover hidden patterns in complex datasets, even with missing data. One of the focus is the exploration of Nonnegative Matrix Factorization (NMF), born from the necessity to meaningfully interpret the low-rank components of the data. We will dive into the complexities of NMF, examine various algorithms to compute it and apply these techniques to diverse applications, from image processing to topic modeling, clustering and blind source separation.

## Technical Details

**Length:** 20-hours course

**Period:** 8-17 April

**Target:** PhD, Master students