

STREAMING TENSOR TRAIN APPROXIMATION

BART VANDEREYCKEN

Tensor trains are a versatile tool to compress and work with high-dimensional data and functions. In this talk I will introduce the Streaming Tensor Train Approximation (STTA), a new class of algorithms for approximating a given tensor T in the tensor train format. STTA accesses T exclusively via two-sided random sketches of the original data, making it streamable and easy to implement in parallel – unlike existing deterministic and randomized tensor train approximations. This property also allows STTA to conveniently leverage structure in T , such as sparsity and various low-rank tensor formats, as well as linear combinations thereof. When Gaussian random matrices are used for sketching, STTA is admissible to an analysis that builds and extends upon existing results on the generalized Nyström approximation for matrices. Our results show that STTA can be expected to attain a nearly optimal approximation error if the sizes of the sketches are suitably chosen. A range of numerical experiments illustrates the performance of STTA compared to existing deterministic and randomized approaches. Joint work with Daniel Kressner (EPFL) and Rik Voorhaar (Geneva).

DEPARTMENT OF MATHEMATICS, UNIVERSITY OF GENEVA, GENEVA, SWITZERLAND
Email address: `bart.vandereycken@unige.ch`