

Applied Mathematics

HLinear: Fast functional linear algebra

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Linear algebra is clearly at the foundations of many computations in theoretical and applied mathematics. Primary focus of implementations is on speed. This has hindered formally verifiable alternatives to gain ground. In this talk, we report on the speakers effort to provide a high performance, verifiable implementation of exact dense linear algebra in Haskell. In some cases, his implementation outperforms the leading C and C++ implementations.

In the talk, we discuss why the case of exact dense linear algebra is particularly accessible in the context of functional programming. In this context, we revisit general benefits of functional programming as opposed to imperative one. We also exhibit which upcoming technologies can be employed to arrive at better performance for a broader class of algorithms. This includes an account of what has to be achieved to promote functional programming to numerical computations.