

Muste – editorial environment for matrix computations

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Abstract

Practical application of multivariate statistical methods requires appropriate tools for the analyses. Such tools should provide flexible and powerful instruments to perform matrix computations. We present an editorial environment for matrix computations that allows to freely mix natural language and computation schemes. The presented matrix interpreter is one part of whole integrated system intended for statistical computing and related tasks.

The history of this system dates back to early 1960s when *Seppo Mustonen* developed a library of matrix subroutines for the Elliott 803 computer [2]. This library was expanded to a statistical programming language *SURVO 66* [1]. Innovative editorial environment was introduced in *SURVO 76* [3] and the current version of the matrix interpreter (created by Mustonen in 1985) is based on the first C language version *SURVO 84C* [4, 5]. Following *SURVO 98* and *SURVO MM*, the newest generation of the system is called *Muste*. *Muste* is an open source implementation of Survo and developed as a multiplatform R package [6]. It is freely available from the R-forge development platform.

We demonstrate the use of *Muste* implementation of the Survo matrix interpreter in the case of so called direct factor analysis in which exploratory factor analysis is considered as a specific data matrix decomposition with fixed unknown matrix parameters. In this recent approach all model unknowns including common and unique factor scores are estimated simultaneously by minimizing a specific object function with an alternating least squares (ALS) algorithm utilizing singular value decomposition (SVD) of data matrices. Such technique also allows to generalize factor analysis into cases with more variables than observations [7].

Keywords

Survo, *Muste*, R-project, Factor analysis, Singular value decomposition, Alternating least squares.

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