**distrMod — an S4-class based package for statistical models**

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The S4 concept ([1]) is a strong tool for writing unified algorithms. As an example for this in R ([3]), we present a new package **distrMod** for a conceptual implementation of statistical models based on these S4-classes. It is part of the **distrXXX** family of packages ([4]), which is available on CRAN for quite a while, and which is developed under the infrastructure of R-Forge ([6]) in project **distr** ([5]).

The infrastructure to package **distrMod** is laid in packages **distr** and **distrEx**.

In package **distr**, we introduce S4 classes for distributions with slots for a parameter and for functions r, d, p, and q corresponding to functions like `rnorm`, `dnorm`, `pnorm`, and `qnorm`. We have made available quite general arithmetical operations to our distribution objects, generating new image distributions automatically, including affine transformations, standard mathematical univariate transformations like `sin`, `abs`, and convolution.

Package **distrEx** provides additional features like evaluation of certain functionals on distributions like expectation, variance, median, and also distances between distributions like total variation-, Hellinger-, Kolmogorov-, and Cramér-von-Mises-distance. Also, (factorized) conditional distributions and expectations are implemented.

Package **distrMod** then implements parametric resp. $L_2$ differentiable models, introducing S4-classes **ParamFamily** and **L2ParamFamily**. Based on these, quite general “Minimum Criterium”-estimators such as Maximum-Likelihood- and Minimum-Distance-Estimators are implemented.

This implementation goes beyond the scope of **fitdistr** from MASS ([7]), as we may work with distribution objects themselves and have available quite general expectation operators...

In short, we are able to implement one static algorithm which by tt S4 method dispatch may take care dynamically about various models, thus avoiding redundancy and simplifying maintenance.

This approach is also taken up to implement optimally robust estimation in the infinitesimal setup of ([4]) and its refinements in ([2]); this will be the topic of a contribution to this conference by the second author.

**References**


Also available in extended and updated version as vignette package **distrDoc** on CRAN

