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April 11, 2022

R Journal
Editorial Board

Dear R Journal Editorial Board,

The motivation for this ‘add-on package’ submission, *Multivariate Subgaussian Stable Distributions in R*, to the R Journal is to showcase the package `mvpd` for the density, (cumulative) distribution, random variate generation, and parameter estimation to given data of multivariate subgaussian stable distributions. In addition to this showcase, we hope the manuscript might serve as an introduction to these possibly lesser-known multivariate distributions, and we aim to put them in context with other more commonly known distributions, such as the multivariate Cauchy and multivariate normal, both of which are in the multivariate subgaussian stable distribution family.

Before `mvpd` appearing on CRAN for the first time in March 2022, there were no packages on CRAN to calculate (cumulative) multivariate subgaussian stable distributions (probabilities), and the only CRAN package to handle density calculations and data-fitting/parameter estimation was the R package `alphastable`. The EM algorithm is the driver in the `alphastable` package and this limits its capacity for larger datasets, comparatively to `mvpd`. Exploiting the results of product distribution theory, `mvpd` provides a way for R users to access multivariate subgaussian stable distributions (the elliptically contoured subclass of general multivariate stable distributions), which are quite important in finance. This class of distributions is fascinating, as they include the Cauchy distribution and the multivariate normal distribution. I am hoping through publication of the paper in The R Journal that its wide readership will find more uses for this flexible, heavy-tailed, elliptically contoured multivariate distribution.

I am happy to have JP Nolan of American University as a co-author. He is one of the foremost experts in univariate and multivariate stable distributions – in theory and in code – with an established teaching and publication record on the topic. He has published numerous journal articles and recently published a textbook on univariate stable distributions. The company he founded, Robust Analysis, has proprietary software, including an R implementation, that he made available for me to benchmark and gauge accuracy of my methods. In addition, he has no objection to my providing the open-source community (CRAN) my product distribution implementation of the multivariate subgaussian stable distribution density, distribution, random variate generation, and parameter fitting code. The R package `mvpd` is coded purely in R and uses no part of his company's proprietary software. The R package `mvpd` is an original contribution to the open source community. As far as we know this is the first time the product distribution formulation has been implemented for multivariate subgaussian stable distributions in R or elsewhere.

We believe that the `mvpd` package is a serviceable and novel contribution to the R community and our paper being published in The R Journal will benefit its broad readership, potentially introducing them to a class of distributions that connects the multivariate Cauchy and multivariate normal distributions.

Sincerely yours,

Bruce Swihart