Robust Linear Modeling using the Hyperbolic Distribution

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Linear regression is a very important statistical tool in many fields. However the analysis results can be misleading when the data violates the assumptions behind. One of the key assumptions of linear regression is the error terms are normally distributed which the financial assets return data often violates. The generalized hyperbolic distribution family, introduced by Barndorff-Nielsen ([1]), possesses the non-Gaussian characters which typically are present in financial assets return data. As a special case of the family, the hyperbolic distribution is also featured semi-heavy tails and exhibits skewness for certain parameter values. We propose an approach to fit linear regression models with hyperbolic distributed error to analyze data with heavy-tail and skewness characters. In this work, we developed a set of *R* functions, including `hyperblm` and `summary.hyperblm` function, to implement this approach and provide the result in an appropriate format. These functions are included in the **GeneralizedHyperbolic** package ([2]).

References

[1] Barndorff-Nielsen, O. (1977, 03). Exponentially decreasing distributions for the logarithm of particle size. *Proceedings of the Royal Society of London. Series A, Mathematical and Physical Sciences 353*, 401–419.

[2] Scott, D. J. (2010). *GeneralizedHyperbolic*. R package version 0.8-1.