



# Slash distributions, generalized convolutions, and extremes

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## Abstract

An  $\alpha$ -slash distribution built upon a random variable  $X$  is a heavy tailed distribution corresponding to  $Y = X/U^{1/\alpha}$ , where  $U$  is standard uniform random variable, independent of  $X$ . We point out and explore a connection between  $\alpha$ -slash distributions, which are gaining popularity in statistical practice, and generalized convolutions, which come up in the probability theory as generalizations of the standard concept of the convolution of probability measures and allow for the operation between the measures to be random itself. The stochastic interpretation of Kendall convolution discussed in this work brings this theoretical concept closer to statistical practice, and leads to new results for  $\alpha$ -slash distributions connected with extremes. In particular, we show that the maximum of independent random variables with  $\alpha$ -slash distributions is also a random variable with an  $\alpha$ -slash distribution. Our theoretical results are illustrated by several examples involving standard and novel probability distributions and extremes.

**Keywords** Extreme value theory · Generalized convolution · Heavy tails · Kendall convolution · Pareto distribution · Slash distribution

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