

# On the Challenge of Fitting Scaling Laws in Ecology

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**Abstract:** Scaling laws appear in a wide range of natural phenomena (Newman 2005). We concentrate on the size distribution of tree stem diameters in tropical forests as a representative example of scaling laws (Enquist and Niklas 2001). Fitting such an empirical size distribution, for example with a power-law, a negative exponential or a Weibull distribution, is usually done using maximum likelihood estimation (MLE) and results in reliable estimation of the unknown parameters (Clauset et al. 2009). However, classification of field data and random measurement errors influence this statistical estimation. We compare three different types of MLE, the common one not accounting for uncertainties in the observation procedure and two modified versions accounting either for binning of data or for random measurement errors. Results show that the two modified MLE methods accounting for such uncertainties are much more robust than the common MLE.

## References

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