

Simulate values from destructive strength testing with R package WoodSimulatR

In September 2020, HolzforSchung Austria concluded the InnoGrading Project which focused on new machine strength grading methods in a multi-stage grading context. InnoGrading followed an Open Innovation approach, where important research methodology should be shared with the public, in the form of extension packages to the open source statistics software R. The first fruit of this approach, the R package WoodSimulatR, has been released on the Comprehensive R Archive Network (cran.r-project.org) in November 2020.

Research is foundationally dependent on data, data of destructive strength tests of sawn timber in the case of machine strength grading research. Such tests are expensive and, therefore, strength data is a limiting factor in our research. On the other hand, the industry extensively use modern strength grading machines which are capable of non-destructively measuring thousands of boards every hour.

For at least a decade, some researchers have been using such data from non-destructive testing (NDT) to simulate data from destructive strength tests in one way or another, but many have been intimidated by the complexities of simulating multiple correlated variables. The R package WoodSimulatR is now offering a unified, extensible and simple to use framework for this kind of simulations.

This framework is generic -- you can use it to add any kind of simulated values of a correlated variable to an existing dataset as long as you have the information about the correlation with some variables already existing in the dataset, and as long as all involved variables are continuous.

Further, the package offers the option to create a dataset of correlated variables from destructive and non-destructive testing from scratch, simulating different origins of the material, with different pre-defined means and standard deviations, or even different correlations.

The WoodSimulatR package also includes a so-called vignette -- in the R world, this is a kind of long form documentation in the style of an article, used to comprehensively explain important aspects of a package. This vignette explains how to simulate entire datasets and how to add simulated values from destructive strength testing to values from NDT measurements. The vignette can be read online at

<https://cran.r-project.org/package=WoodSimulatR>

If you already have R installed on your computer, adding the WoodSimulatR package is easy: just type the following into your R console while you are connected to the internet:

```
install.packages("WoodSimulatR")
```

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