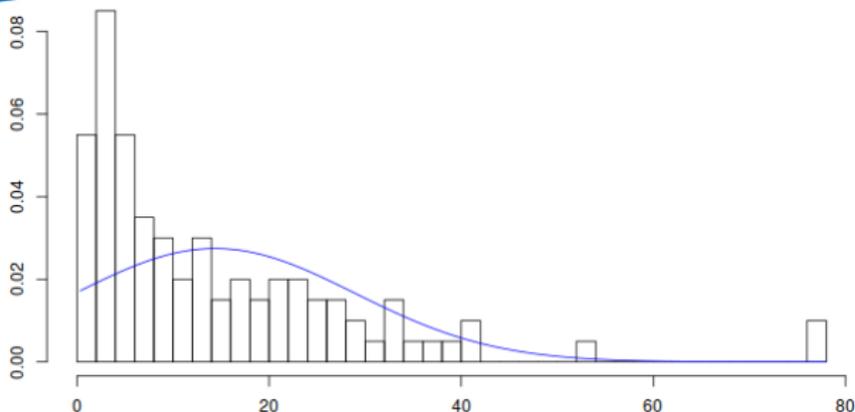CARL
VON
OSSIETZKY
universität | OLDENBURG

**Distribution Fitting in Insurance
with the Shiny App DistrFit**

Kornelius Rohmeyer, Ralph Scherer

14th June 2019

Distribution fitting from loss data

distrFit is an R package and Shiny app for the estimation of loss and count distributions for individual claims and their frequency.

We want to give credit to the packages `distrMod` and `distrfitplus`, whose features it combines, extends and streamlines.

■ **distrMod**: Kohl, M., & Ruckdeschel, P. (2010). R Package distrMod: S4 Classes and Methods for Probability Models. *JSS*, 35(10), 1-27.

■ **distrfitplus**: Delignette-Muller, M. L., & Dutang, C. (2015). fitdistrplus: An R package for fitting distributions. *JSS*, 64(4), 1-34.
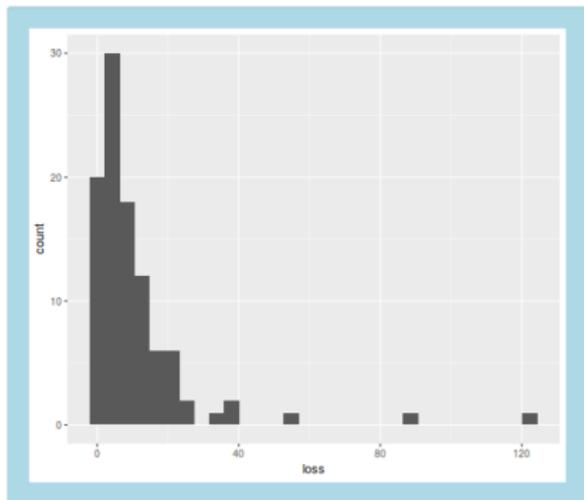
Data Input

Input format

○ Excel ○ Copy&Paste ● R Expression ○ Example

Loss generating R expression

```
rlnorm(100, log(7), log(3))
```

Joint work of

CARL
VON
OSSIETZKY
universität
OLDENBURG

and

talanx.
Reinsurance Broker

Number of Losses

100

Mean of Losses

11.30897

Standard Deviation of Losses

16.5643

Maximum Loss

122.5168

Minimum Loss

0.2286155

Median of Losses

6.370718

NAs

0

Features

Data Preprocessing

Data Input

Fitting

- via maximum likelihood, moment and quantile matching or goodness-of-fit distances
- under constraints
- mixed distributions
- robust estimation

Numerical stability

- scaling
- reparametrization
- dependence on selected start values for iterative algorithms
- manual fitting and start values

Diagnostic Plots

- outlier detection
- influence curves
- qq, pp, with confidence bands (pointwise, simultaneous)
- bootstrap (parametric/non-parametric)
- Cullen and Frey plot, Hillplot

Ranking

- weighted user specified criteria
- tailored Ranking

Reports

- reproducability

# Shiny apps for insurance pricing

DistrFit

- can be integrated into an existing workflow,
- has a user-friendly interface,
- is accessible from the browser and
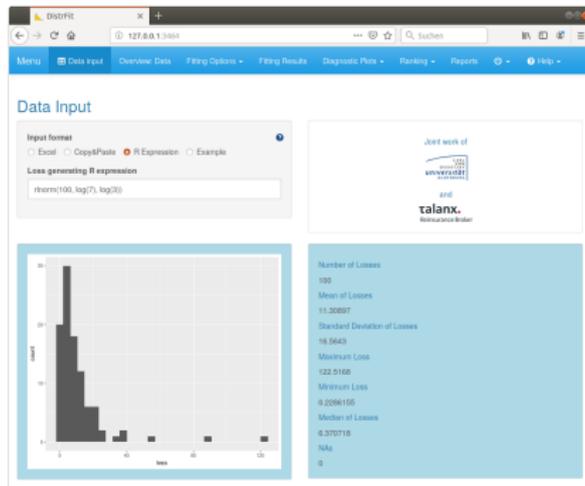- has to be maintained only on a server.

Our goal is to provide further shiny apps for insurance pricing:

- Preprocessing, claim development
- Burning cost, exposure pricing
- Extended calculations/simulations depending on reinsurance contract structures, etc.
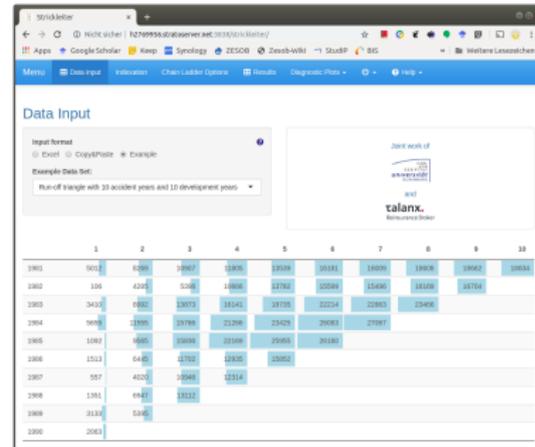
Thank you for your attention.
Questions or suggestions are very welcome!

http://distrfit.com/