

# ffbase: statistical functions for large datasets

Edwin de Jonge<sup>1</sup>, Jan Wijffels<sup>2</sup>

1. Statistics Netherlands, [e.dejonge@cbs.nl](mailto:e.dejonge@cbs.nl)

2. BNOSAC - Belgium Network of Open Source Analytical Consultants, [jwijffels@bnosac.be](mailto:jwijffels@bnosac.be)

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Statistical datasets used to be small, but nowadays it is not uncommon that the dataset is too large to be handled in R without encountering the frequently encountered **Error: cannot allocate vector of size ...Mb** issue.

To handle the R memory constraints, the **ff** package (Adler & Oehlschlägel et al.) was developed in 2008. It handles the memory constraint by storing data on disk. For day-to-day data munging, frequently used functionality from the **base** package had to be developed to make it more easy for an R developer to work with package **ff**. For this, the **ffbase** package has been developed to extend the **ff** package to allow basic statistical operations on large data frames, especially *ffdf* objects.

The **ffbase** package contains a lot of the functionality from the R's base package for usage with large datasets through package **ff**. Namely

- Basic operations (`c`, `unique`, `duplicated`, `ffmatch`, `ffdfmatch`, `%in%`, `is.na`, `all`, `any`, `cut`, `ffwhich`, `ffappend`, `ffdfappend`, `rbind`, `ffifelse`, `ffseq`, `ffrep.int`, `ffseq.len`)
- Standard operators (`+`, `-`, `*`, `/`, `^`, `%%`, `%/%`, `==`, `!=`, `<`, `<=`, `>=`, `>`, `&`, `|`, `!`) working on *ff* vectors
- Math operators (`abs`, `sign`, `sqrt`, `ceiling`, `floor`, `trunc`, `round`, `signif`, `log`, `log10`, `log2`, `log1p`, `exp`, `expm1`, `acos`, `acosh`, `asin`, `asinh`, `atan`, `atanh`, `cos`, `cosh`, `sin`, `sinh`, `tan`, `tanh`, `gamma`, `lgamma`, `digamma`, `trigamma`)
- Selections & data manipulations (`subset`, `transform`, `with`, `within`, `ffwhich`)
- Summary statistics (`sum`, `min`, `max`, `range`, `quantile`, `hist`, `binned.sum`, `binned.tabulate`)
- Data transformations (`cumsum`, `cumprod`, `cummin`, `cummax`, `table.ff`, `tabulate.ff`, `merge`, `ffdfply`, `as.Date`, `format`)
- Chunked functionalities (`chunkify`), writing & loading data (`load.ffdf`, `save.ffdf`, `move.ffdf`, `laf.to.ffdf`)

For modelling purposes, **ffbase** has `bigglm.ffdf` to allow to build generalized linear models easily on large data and can connect to the **stream** package for clustering & classification.

In the presentation, the **ffbase** package will be showcased to show that working with large datasets without having RAM issues in R is easy and natural for an R programmer.

## References

Daniel Adler, Christian Glser, Oleg Nenadic, Jens Oehlschlägel and Walter Zucchini (2013). *ff*: memory-efficient storage of large data on disk and fast access functions. R package version 2.2-11. <http://CRAN.R-project.org/package=ff>

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