MONASH University

25 years of open source forecasting software

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25 June 2025

Outline

Outline

Early R forecasting (c.2000)

`ts` package (now `stats` package):

- `HoltWinters()`: point forecasts only, with optional multiplicative seasonality (written by David Meyer).
- `arima()`: state space formulation of ARIMA models (written by Brian Ripley).
- `structTS()`: Basic structural models as per Harvey (written by Brian Ripley).

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- Each had a `predict()` method, but output was inconsistent.
- `HoltWinters` did not produce prediction intervals.

forecast package for R

- Consistent output for existing methods by introducting new S3 generic `forecast()` and new S3 class `forecast`.
- Add new methods including `ets()`, `thetaf()`, `auto.arima()`.
- Modelling functions should be able to be swapped while leaving code unchanged.
- Easy plotting tools with new `plot.forecast()` method.
- Add forecasting tools such as `accuracy()` calculations.

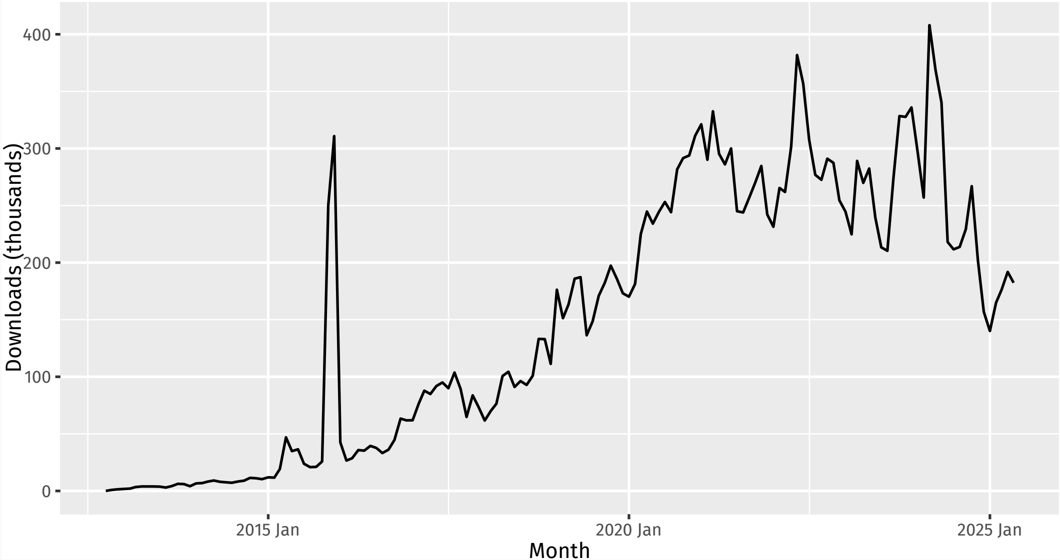
forecast package for R

Date	Event
Pre 2003	Collection of functions used for consulting projects
July/August 2003	`ets()` and `thetaf()` added
August 2006	**v1.0** available on CRAN
May 2007	`auto.arima()` added
July 2008	JSS paper (Hyndman & Khandakar)
September 2009	**v2.0**. Unbundled from Mcomp, fma & expsmooth
May 2010	`arfima()` added
Feb/March 2011	`tslm()`, `stlf()`, `naive()`, `snaive()` added
August 2011	**v3.0**. Box Cox transformations added
December 2011	`tbats()` added

forecast package for R

Date	Event
April 2012	Package moved to github
November 2012	**v4.0**. `nnetar()` added
June 2013	Major speed-up of `ets()`
January 2014	**v5.0**. `tsoutliers()` and `tsclean()` added
May 2015	**v6.0**. Added several new plots
February 2016	**v7.0**. Added ggplot2 graphics & bias adjustment
March 2017	**v8.0**. Added `tsCV()` & `baggedETS()`
April 2018	**v8.3**. Added `mstl()`, and revised `auto.arima()`
April 2025	**v8.24**. Last update

forecast package for R



forecast package for R

- `auto.arima` + `forecast`
- `ets` + `forecast`
- `tbats` + `forecast`
- `bats` + `forecast`
- `arfima` + `forecast`
- `nnetar` + `forecast`
- `stlm` + `forecast`
- `meanf`
- `rwf`, `naive`
- `thetaf`
- `dshw`, `hw`, `holt`, `ses`
- `splinef`
- `croston`

All produce an object of class `forecast`

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All produce an object of class `forecast`

v9.0 will have new model functions:

- `mean_model()`
- `rw_model()`
- `theta_model()`
- `spline_model()`
- `croston_model`

CRAN Task View Time Series

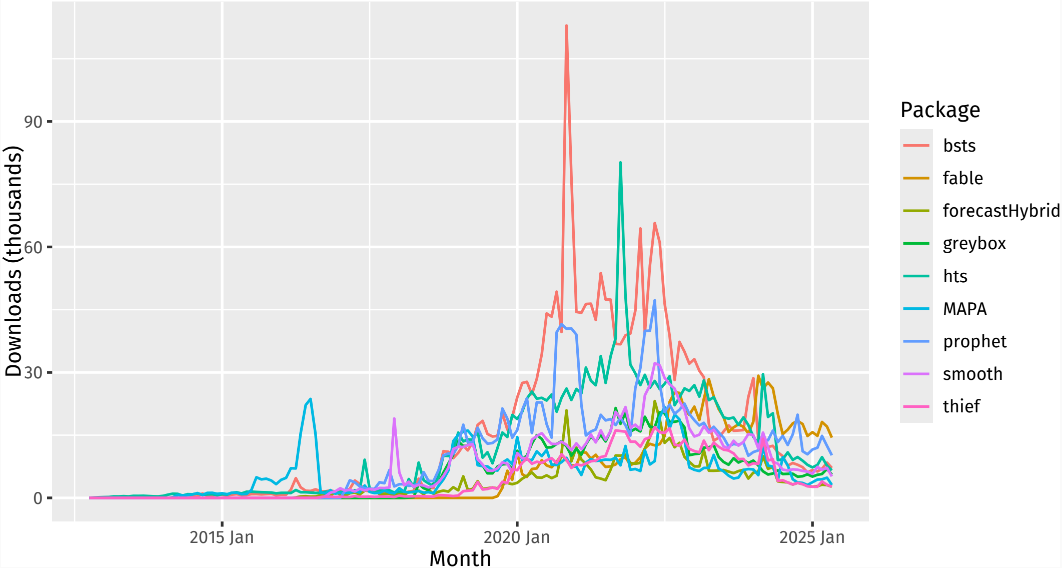
CRAN Task View: Time Series Analysis

Maintainer:	Rob J Hyndman, Rebecca Killick
Contact:	Rob.Hyndman at monash.edu
Version:	2025-05-17
URL:	https://CRAN.R-project.org/view=TimeSeries
Source:	https://github.com/cran-task-views/TimeSeries/
Contributions:	Suggestions and improvements for this task view are very welcome and can be made through issues or pull requests on GitHub or via e-mail to the maintainer address. For further details see the Contributing guide.
Citation:	Rob J Hyndman, Rebecca Killick (2025). CRAN Task View: Time Series Analysis. Version 2025-05-17. URL https://CRAN.R-project.org/view=TimeSeries.
Installation:	The packages from this task view can be installed automatically using the ctv package. For example, `ctv::install.views("TimeSeries", coreOnly = TRUE)` installs all the core packages or `ctv::update.views("TimeSeries")` installs all packages that are not yet installed and up-to-date. See the CRAN Task View Initiative for more details.

Top ten downloaded forecasting packages on CRAN

Package	Downloads ('000)
forecast	22782.6
bsts	2321.9
hts	1792.5
prophet	1577.7
smooth	1159.0
fable	981.5
greybox	910.4
MAPA	877.2
thief	672.6
forecastHybrid	565.2

Top ten downloaded forecasting packages on CRAN



Outline

Python packages

- `pmdarima`
- `sktime`
- Nixtla: `statsforecast`, `hierarchicalforecast`
- `GluonTS`
- `Merlion`
- `statsmodels`,
- `pyhts`
- `Darts`

Outline

Julia

- `forecast`