Machine Learning in R

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Why a Machine Learning Framework?

- New algorithms are mostly implemented in C(++) with bindings to R/python/julia
- Frameworks unify the API, crucial for comparison of many algorithms
- Popular Frameworks:
  - Python: sk-learn
  - Julia: mlj
  - R: caret (no longer maintained), tidymodels, mlr
  - Rapidminer
  - Weka
  - ...
Abstraction for machine learning in R:
- > 100 Learners, > 30 performance measures, > 30 variable selection filters
- classification, regression, clustering, survival, multiclass, anomaly detection, functional data analysis
- tuning, visualization, pipelines, parallelization
- Addons for Bayesian Optimization, AutoML, XAI,

Popular and stable, recommended by NIST

> 20 Contributors, 8 GSOC projects
- Reboot started by **MCML** (mlr3) and **ATI** (mlj)
- Object orientation
- Modularization into multiple packages
- Native support for big data
- Full parallelization support (from threading to distributed computing on HPCs)
- First released version includes:
  - objects for all building blocks: tasks, learners, measures, resamplings, ...
  - parallel resampling and benchmarking
  - hyperparameter tuning in **mlr3tuning**
  - nested resampling
  - data flow programming as DAGs in **mlr3pipelines**
mlr3 is for scientists

- Completely reproducible results
- Compare many algorithms with only a few lines of code
- Interpretable machine learning (XAI)
- Publication-ready yet customizable plots
- Construct custom pipelines
- Extend objects for your domain as needed
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