

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 - R: caret (no longer maintained), tidymodels, [mlr](#)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
 - ...

mlr



- 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

[PDF] mlr: Machine Learning in R

[B Bischl](#), [M Lang](#), [L Kotthoff](#), [J Schiffner](#)... - ... of [Machine Learning](#) ..., 2016 - [jmlr.org](#)

The **mlr** package provides a generic, object-oriented, and extensible framework for classification, regression, survival analysis and clustering for the R language. It provides a unified interface to more than 160 basic learners and includes meta-algorithms and model ...

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mlr is a machine learning package for R that provides an interface to many other packages.

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225 questions

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[PDF] To Tune or Not to Tune the Number of Trees in Random Forest.

[P Probst](#), [AL Boulesteix](#) - [Journal of Machine Learning Research](#), 2017 - [jmlr.org](#)

Automated Neuron Detection in High-Content Fluorescence Microscopy Images Using Machine Learning

[G Mata](#), [M Radojević](#), [C Fernandez-Lozano](#), [I Smajčić](#)... - [Neuroinformatics](#), 2019 - [Springer](#)

The study of neuronal morphology in relation to function, and the development of medicines to positively impact this relationship are important for understanding diseases.

[HTML] Genetic signature to provide robust risk assessment of psoriatic development in psoriasis patients

[MT Patrick](#), [PE Stuart](#), [K Raja](#), [JE Gudjonsson](#)... - [Nature](#) ..., 2018 - [nature.com](#)

Psoriatic arthritis (PsA) is a complex chronic musculoskeletal condition that occurs in psoriasis patients. Currently, no systematic strategy is available that utilizes the genetic architecture between PsA and cutaneous-only psoriasis (PsC).

Evaluating Multi-Label Classifiers and Recommender Systems in the Service Sector

[M Bogaert](#), [J Lootens](#), [D Van den Poel](#)... - [European Journal of ...](#), 2019 - [Elsevier](#)

The objective of this paper is to evaluate multi-label classification techniques and recommender systems for cross-sell purposes in the financial services sector. We carried out three analyses using data obtained from an international financial services provider. First, we evaluated the performance of different multi-label classification techniques.

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[HTML] Random forest as a generic framework for predictive modeling of spatial and spatio-temporal variables

[M Nussbaum](#), [MN Wright](#), [GBM Heuvelink](#)... - [PeerJ](#), 2018 - [peerj.com](#)

Machine Learning techniques are already used to generate predictive models of spatial and spatio-temporal variables.

Model-based optimization of subgroup weights for survival analysis

[K Medlar](#), [J Rahnenführer](#) - [Bioinformatics](#), 2019 - [academic.oup.com](#)

mlrMBO: A modular framework for model-based optimization of expensive black-box functions

[B Bischl](#), [J Richter](#), [J Bossek](#), [D Horn](#), [J Thomas](#)... - [arXiv preprint arXiv](#) ..., 2017 - [arxiv.org](#)

We present mlrMBO, a flexible and comprehensive R toolbox for model-based optimization (MBO), also known as Bayesian optimization, which addresses the problem of expensive black-box optimization by approximating the given objective function through a surrogate ...

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A continental system for forecasting bird migration

[BM Van Doren](#), [KG Horton](#) - [Science](#), 2018 - [science.sciencemag.org](#)

Billions of animals cross the globe each year during seasonal migrations, but efforts to monitor them are hampered by the unpredictability of their movements. We developed a migration forecast system at a continental scale by leveraging machine learning.

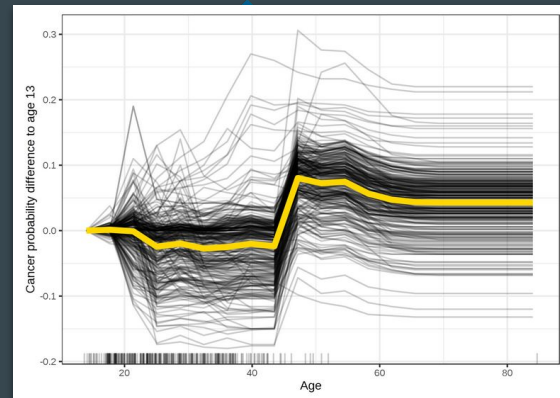
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- Reboot started by [MCML](#) (mlr3) and [ATI](#) (mlj)
- Object orientation
- Modularization into multiple packages
- Native support for big data
- Full parallelization support (from threading to distributed computing on HPCs)
- First released version 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](#)

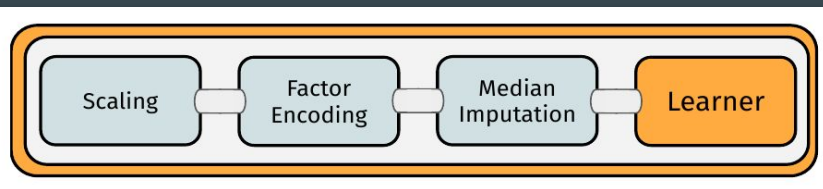
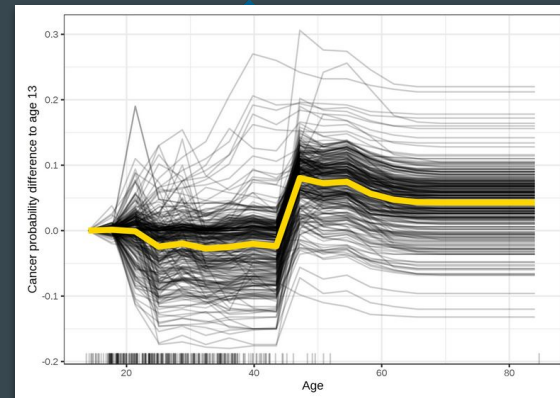
mlr3 is for scientists

- 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



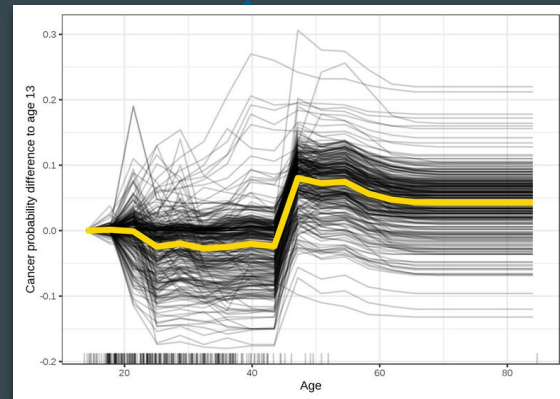
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```
graph_stack = gunion(list(  
  po("learner_cv", learner = lrn("regr.lm")),  
  po("learner_cv", learner = lrn("regr.svm")),  
  po("nop")) %>>%  
  po("featureunion") %>>%  
  lrn("regr.ranger")
```

