

# Package ‘corels’

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**Type** Package

**Title** R Binding for the 'Certifiably Optimal Rule ListS (Corels)'  
Learner

**Version** 0.0.5

**Date** 2024-12-04

**Description** The 'Certifiably Optimal Rule ListS (Corels)' learner by Angelino et al described in <[doi:10.48550/arXiv.1704.01701](https://doi.org/10.48550/arXiv.1704.01701)> provides interpretable decision rules with an optimality guarantee, and is made available to R with this package. See the file 'AUTHORS' for a list of copyright holders and contributors.

**License** GPL (>= 2)

**Imports** Rcpp (>= 1.0.2)

**LinkingTo** Rcpp

**RoxygenNote** 6.0.1

**URL** <https://github.com/corels/rcppcorels>

**BugReports** <https://github.com/corels/rcppcorels/issues>

**NeedsCompilation** yes

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Contents

corels-package . . . . .	2
corels . . . . .	2
<b>Index</b>	<b>5</b>

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corels-package	<i>R Binding for the 'Certifiably Optimal Rule ListS (Corels)' Learner</i>
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Description

The 'Certifiably Optimal Rule ListS (Corels)' learner by Angelino et al described in <doi:10.48550/arXiv.1704.01701> provides interpretable decision rules with an optimality guarantee, and is made available to R with this package. See the file 'AUTHORS' for a list of copyright holders and contributors.

Package Content

Index of help topics:

corels	Corels interace
corels-package	R Binding for the 'Certifiably Optimal Rule ListS (Corels)' Learner

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corels	<i>Corels interace</i>
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Description

R Interface to 'Certifiably Optimal Rule ListS (Corels)'

Usage

```
corels(rules_file, labels_file, log_dir, meta_file = "", run_bfs = FALSE,
  calculate_size = FALSE, run_curiosity = FALSE, curiosity_policy = 0L,
  latex_out = FALSE, map_type = 0L, verbosity_policy = 0L,
  max_num_nodes = 100000L, regularization = 0.01,
  logging_frequency = 1000L, ablation = 0L)
```

## Arguments

rules_file	Character variable with file name for training data; see corels documentation and data section below.
labels_file	Character variable with file name for training data labels; see corels documentation and data section below.
log_dir	Character variable with logfile directory name
meta_file	Optional character variable with file name for minor data with bit vector to support equivalent points bound (see Theorem 20 in Section 3.14).
run_bfs	Boolean toggle for ‘breadth-first search’. Exactly one of ‘breadth-first search’ or ‘curiosity_policy’ <i>must</i> be specified.
calculate_size	Optional boolean toggle to calculate upper bound on remaining search space size which adds a small overhead; default is to not do this.
run_curiosity	Boolean toggle
curiosity_policy	Integer value (between 1 and 4) for best-fist search policy. Exactly one of ‘breadth-first search’ or ‘curiosity_policy’ <i>must</i> be specified. The four different prirization schemes are chosen, respectively, by values of one for prioritize by curiosity (see Section 5.1 of the paper), two for prioritize by the lower bound, three for prioritize by the objective or four for depth-first search.
latex_out	Optional boolean toggle to select LaTeX output of the output rule list.
map_type	Optional integer value for the symmetry-aware map. Use zero for no symmetry-aware map (this is also the default), one for permutation map, and two for the captured vector map.
verbosity_policy	Optional character variable one containing one or more of the terms ‘rule’, ‘label’, ‘minor’, ‘samples’, ‘progress’, ‘loud’, or ‘silent’.
max_num_nodes	Integer value for the maximum trie cache size; execution stops when the number of node isn trie exceeds this number; default is 100000.
regularization	Optional double value, default is 0.01 which can be thought of as a penalty equivalent to misclassifying 1% of the data when increasing the length of a rule list by one association rule.
logging_frequency	Optional integer value with default of 1000.
ablation	Integer value, default value is zero, one excludes the minimum support bounds (see Section 3.7), two excludes the lookahead bound (see Lemma 2 in Section 3.4).

## Details

CORELS is a custom discrete optimization technique for building rule lists over a categorical feature space. The algorithm provides the optimal solution with a certificate of optimality. By leveraging algorithmic bounds, efficient data structures, and computational reuse, it achieves several orders of magnitude speedup in time and a massive reduction of memory consumption. This approach produces optimal rule lists on practical problems in seconds, and offers a novel alternative to CART and other decision tree methods.

**Value**

A constant bool for now

**References**

Elaine Angelino, Nicholas Larus-Stone, Daniel Alabi, Margo Seltzer, and Cynthia Rudin. \*Learning Certifiably Optimal Rule Lists for Categorical Data.\* JMLR 2018, <http://www.jmlr.org/papers/volume18/17-716/17-716.pdf> Nicholas Larus-Stone, Elaine Angelino, Daniel Alabi, Margo Seltzer, Vassilios Kaxiras, Aditya Saligrama, Cynthia Rudin. \*Systems Optimizations for Learning Certifiably Optimal Rule Lists\*. SysML 2018 <http://www.sysml.cc/doc/2018/54.pdf> Nicholas Larus-Stone. \*Learning Certifiably Optimal Rule Lists: A Case For Discrete Optimization in the 21st Century. Senior thesis 2017. <https://dash.harvard.edu/handle/1/38811502>. Elaine Angelino, Nicholas Larus-Stone, Daniel Alabi, Margo Seltzer, Cynthia Rudin. \*Learning certifiably optimal rule lists for categorical data\*. KDD 2017, <https://www.kdd.org/kdd2017/papers/view/learning-certifiably-optimal-rule-lists-for-categorical-data>.

**See Also**

The corels C++ implementation at <https://github.com/nlarusstone/corels>, the website at <https://github.com/nlarusstone/corels> and the Python implementation at <https://github.com/fingoldin/pycorels>.

**Examples**

```
library(corels)

logdir <- tempdir()
rules_file <- system.file("sample_data", "compas_train.out", package="corels")
labels_file <- system.file("sample_data", "compas_train.label", package="corels")
meta_file <- system.file("sample_data", "compas_train.minor", package="corels")

stopifnot(file.exists(rules_file),
           file.exists(labels_file),
           file.exists(meta_file),
           dir.exists(logdir))

corels(rules_file, labels_file, logdir, meta_file,
       verbosity_policy = "silent",
       regularization = 0.015,
       curiosity_policy = 2, # by lower bound
       map_type = 1) # permutation map
cat("See ", logdir, " for result file.")
```

# Index

\* **package**  
    corels-package, [2](#)

corels, [2](#)  
corels-package, [2](#)