

# Package ‘COLP’

May 7, 2026

**Type** Package

**Title** Causal Discovery for Categorical Data with Label Permutation

**Version** 1.0.0

**Date** 2022-09-23

**Description** Discover causality for bivariate categorical data. This package aims to enable users to discover causality for bivariate observational categorical data. See Ni, Y. (2022) <[doi:10.48550/arXiv.2209.08579](https://doi.org/10.48550/arXiv.2209.08579)> ``Bivariate Causal Discovery for Categorical Data via Classification with Optimal Label Permutation. Advances in Neural Information Processing Systems 35 (in press)".

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**Encoding** UTF-8

**LazyData** true

**RoxygenNote** 7.1.2

**Imports** MASS, combinat, stats

**URL** <https://github.com/nySTAT/COLP>

**BugReports** <https://github.com/nySTAT/COLP/issues>

**NeedsCompilation** no

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**Depends** R (>= 3.5.0)

**Repository** CRAN

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CatPairs	<i>Categorical Cause-Effect Pairs</i>
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**Description**

Cause-effect pairs extracted from R packages MASS and datasets for which the pairwise causal relationships are clear from the context, and at least one of the variables in each pair is categorical. For non-categorical variable, we discretized it at 5 evenly spaced quantiles. The current version contains 33 categorical cause-effect pairs.

**Usage**

```
data(CatPairs)
```

**Format**

A list of length 2. The first element is a list of 33 cause-effect pairs as data frames with the first column being the cause and the second column being the effect. The second element is a list of sources of each pair.

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COLP	<i>Causal Discovery for Bivariate Categorical Data</i>
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**Description**

Estimate a causal directed acyclic graph (DAG) for ordinal categorical data with greedy or exhaustive search.

**Usage**

```
COLP(y, x, algo = "E")
```

**Arguments**

y	factor, a potential effect variable
x	factor, a potential cause variable
algo	exhaustive search (algo="E") of category ordering or greedy search (algo="G")

**Value**

A list of length 3. cd = 1 if x causes y; cd = 0 otherwise. P is the optimal ordering of the effect variable. epsilon is the difference in log-likelihood favoring x causes y.

**Examples**

```
fit = COLP(CatPairs[[1]][[1]]$Diffwt, CatPairs[[1]][[1]]$Treat, algo="E")
fit$cd
```

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\* **datasets**

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