Package ‘fastrerandomize’

January 10, 2024

Title fastrerandomize: R Package for Ultra-fast Re-randomization Using a JAX Backend

Version 0.1

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Description An R Package for Ultra-fast Re-randomization Using a JAX Backend

Depends R (>= 3.3.3)

Encoding UTF-8

LazyData false

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Imports reticulate

RoxygenNote 7.2.3

R topics documented:

`GenerateCausalData` *This function generates simulated causal data based on specified parameters.*

Description

This function generates simulated causal data based on specified parameters.

Usage

```
GenerateCausalData(
  n_units,
  proportion_treated,
  k_covars,
  rho,
  SD_inherent,
  treatment_effect_mean,
  treatment_effect_SD,
  covariates_SD,
  Y0_coefficients = NULL,
  Y1_coefficients = NULL
)
```

Arguments

`n_units` A numeric value specifying the total number of units in the sample.

`proportion_treated` A numeric value between 0 and 1 indicating the proportion of units that receive treatment.

`k_covars` A numeric value indicating the number of covariates to be generated.

`rho` A numeric value representing the correlation coefficient.

`SD_inherent` A numeric value indicating the standard deviation inherent to the data.

`treatment_effect_mean` A numeric value representing the mean of the treatment effect.

`treatment_effect_SD` A numeric value indicating the standard deviation of the treatment effect.

`covariates_SD` A numeric value or vector specifying the standard deviation of the covariates.

`Y0_coefficients` An optional numeric vector specifying the coefficients for the control outcome model. If not provided, the function assumes a NULL value.

`Y1_coefficients` An optional numeric vector specifying the coefficients for the treated outcome model. If not provided, the function assumes a NULL value.

Value

A list consisting of

- `data_matrix` A data frame containing the simulated covariates and outcomes for both control (Y0) and treatment (Y1) groups.
- `Y0_coefficients` A numeric vector representing the coefficients used for the control outcome model.
- `Y1_coefficients` A numeric vector representing the coefficients used for the treated outcome model.

Examples

```
# For a tutorial, see
# github.com/cjerzak/fastrerandomization-software
```

`GenerateRandomizations` *Fast generation of all possible complete randomizations given target number of experimental units.*

Description

Fast generation of all possible complete randomizations given target number of experimental units.

Usage

```
GenerateRandomizations(
  n_units,
  n_treated,
  X = NULL,
  randomization_accept_prob = 1
)
```

Arguments

`n_units` A integer specifying total number of experimental units.

`n_treated` An integer specifying total number of treated units.

Value

A JAX array containing all possible complete randomizations.

Examples

```
# For a tutorial, see
# github.com/cjerzak/fastrerandomization-software
```

`InitializeJAX` *Initialize JAX*

Description

Initialize JAX

Usage

```
InitializeJAX(conda_env = NULL, conda_env_required = T)
```

Arguments

`conda_env` An optioanl character string representing the conda environment to activate. A version of JAX should live in that environment. If NULL, we look in the default Python environment for JAX.

`conda_env_required` A logical representing whether to force use the specified conda environment. Used only if `conda_env` specified.

Value

This function initializes a JAX-containing conda environment as specified by `conda_env`. This function must be run before any others in `fastrerandomize`.

Examples

```
# For a tutorial, see
# github.com/cjerzak/fastrerandomization-software
```

`QJEData` *QJEData*

Description

The dataset originates from the study "Moral hazard: Experimental evidence from tenancy contracts" by Burchardi, Konrad B et al., published in "The Quarterly Journal of Economics" in 2019 (Volume 134, Issue 1, Pages 281-347).

Usage

```
QJEData
```

Format

A data frame with 968 rows and many columns containing treatment data for a Quarterly Journal of Economics experiment on agriculture.

Source

Burchardi, Konrad B et al. (2019). "Moral hazard: Experimental evidence from tenancy contracts." In: The Quarterly Journal of Economics 134.1, pp. 281–347

`RandomizationTest` *Fast randomization test*

Description

Fast randomization test

Usage

```
RandomizationTest(
  obsW = NULL,
  obsY = NULL,
  X = NULL,
  alpha = 0.05,
  candidate_randomizations = NULL,
  candidate_randomizations_array = NULL,
  n0_array = NULL,
```

```
  n1_array = NULL,
  prior_treatment_effect_mean = NULL,
  prior_treatment_effect_SD = NULL,
  true_treatment_effect = NULL,
  simulate = F,
  coef_prior = NULL,
  nSimulate_obsW = 50L,
  nSimulate_obsY = 50L,
  randomization_accept_prob = 1,
  findFI = F,
  c_initial = 2
)
```

Arguments

`obsW` A numeric vector where `0`'s correspond to control units and `1`'s to treated units.

`obsY` An optional numeric vector of observed outcomes. If not provided, the function assumes a NULL value.

`X` A numeric matrix of covariates.

`alpha` The significance level for the test. Default is `0.05`.

`candidate_randomizations`
A numeric matrix of candidate randomizations.

`candidate_randomizations_array`
An optional JAX array of candidate randomizations. If not provided, the function coerces `candidate_randomizations` into a JAX array.

`n0_array` An optional array specifying the number of control units.

`n1_array` An optional array specifying the number of treated units.

`prior_treatment_effect_mean`
An optional numeric value for the prior mean of the treatment effect. Default is NULL.

`prior_treatment_effect_SD`
An optional numeric value for the prior standard deviation of the treatment effect. Default is NULL.

`true_treatment_effect`
An optional numeric value specifying the true treatment effect. Default is NULL.

`simulate` A logical value indicating whether to run `RandomizationTest` in simulation mode. Default is FALSE.

`coef_prior` An optional function generating coefficients on values of `X` for predicting `Y(0)`.

`nSimulate_obsW` A numeric value specifying the number of simulated values for obsW. Default is `50L`.

`nSimulate_obsY` A numeric value specifying the number of simulated values for obsY. Default is `50L`.

`randomization_accept_prob`
An numeric scalar or vector of probabilities for accepting each randomization.

`findFI` A logical value indicating whether to find the fiducial interval. Default is FALSE.

`c_initial` A numeric value representing the initial criterion for the randomization. Default is 2.

Value

A list consisting of

- p_value A numeric value or vector representing the p-value of the test (or the expected p-value under the prior structure specified in the function inputs).
- FI A numeric vector representing the fiducial interval if findFI=T.
- tau_obs A numeric value or vector representing the estimated treatment effect(s)

References

-

Examples

```
# For a tutorial, see
# github.com/cjerzak/fastrerandomization-software
```

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