

# Package ‘fastrerandomize’

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**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)

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**Encoding** UTF-8

**LazyData** false

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**Imports** reticulate

**RoxygenNote** 7.2.3

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GenerateCausalData	<i>This function generates simulated causal data based on specified parameters.</i>
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## 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**

<code>n_units</code>	A numeric value specifying the total number of units in the sample.
<code>proportion_treated</code>	A numeric value between 0 and 1 indicating the proportion of units that receive treatment.
<code>k_covars</code>	A numeric value indicating the number of covariates to be generated.
<code>rho</code>	A numeric value representing the correlation coefficient.
<code>SD_inherent</code>	A numeric value indicating the standard deviation inherent to the data.
<code>treatment_effect_mean</code>	A numeric value representing the mean of the treatment effect.
<code>treatment_effect_SD</code>	A numeric value indicating the standard deviation of the treatment effect.
<code>covariates_SD</code>	A numeric value or vector specifying the standard deviation of the covariates.
<code>Y0_coefficients</code>	An optional numeric vector specifying the coefficients for the control outcome model. If not provided, the function assumes a NULL value.
<code>Y1_coefficients</code>	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/cjerkzak/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)
```

### 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
```

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QJEData	<i>QJEData</i>
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**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

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RandomizationTest	<i>Fast randomization test</i>
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**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**

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**Examples**

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

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