

# Package ‘epiworldRcalibrate’

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**URL** <https://sima-njf.github.io/epiworldRcalibrate/>,  
<https://github.com/sima-njf/epiworldRcalibrate>

**BugReports** <https://github.com/sima-njf/epiworldRcalibrate/issues>

**Title** Fast and Effortless Calibration of Agent-Based Models using  
Machine Learning

**Version** 0.1.4

**Description** Provides tools and pre-trained Machine Learning [ML] models for calibration of Agent-Based Models [ABMs] built with the R package 'epiworldR'. Implements methods described in Najafzadehkhoie, Vega Yon, Modenesi, and Meyer (2025) <[doi:10.48550/arXiv.2509.07013](https://doi.org/10.48550/arXiv.2509.07013)>. Users can automatically calibrate ABMs in seconds with pre-trained ML models, effectively focusing on simulation rather than calibration. Bridges a gap by allowing public health practitioners to run their own ABMs without the advanced technical expertise often required by calibration.

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**Encoding** UTF-8

**RoxygenNote** 7.3.3

**Suggests** testthat (>= 3.0.0), epiworldR

**Config/testthat/edition** 3

**Imports** reticulate (>= 1.41), utils

**Depends** R (>= 3.5)

**LazyData** true

**NeedsCompilation** no

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abc\_calibration\_params

*ABC calibration results for COVID-19 SIR model*

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## Description

Results from Approximate Bayesian Computation (ABC) calibration of an SIR network model fitted to Utah COVID-19 incidence data.

## Usage

abc\_calibration\_params

## Format

A named list with the following elements:

**contact\_rate** Posterior median of the contact rate.

**recovery\_rate** Posterior median of the recovery rate.

**transmission\_prob** Posterior median of the transmission probability.

**R0** Basic reproduction number computed from posterior medians.

**contact\_rate\_ci** 95 percent credible interval for the contact rate.

**recovery\_rate\_ci** 95 percent credible interval for the recovery rate.

**transmission\_prob\_ci** 95 percent credible interval for the transmission probability.

**calibration\_time\_seconds** Total runtime of the ABC calibration (seconds).

**n\_samples** Number of MCMC samples used in calibration.

**burnin** Number of burn-in iterations discarded.  
**epsilon** ABC tolerance parameter.  
**seed** Random seed used for reproducibility.  
**posterior\_samples** Matrix of post-burn-in accepted parameter samples.  
**acceptance\_rate** Acceptance rate of the ABC-MCMC algorithm (percent).

### Source

Generated internally using the script `data-raw/process_covid_calibration.R`.

### Examples

```
data("abc_calibration_params")
str(abc_calibration_params)
```

---

calibrate_sir	<i>Calibrate SIR Parameters (one-step convenience wrapper)</i>
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### Description

Optionally initializes the BiLSTM model and then calls `estimate_sir_parameters` on the provided data.

### Usage

```
calibrate_sir(
  daily_cases,
  population_size,
  recovery_rate,
  model_dir = NULL,
  auto_init = TRUE
)
```

### Arguments

<code>daily_cases</code>	Numeric vector of length 61 containing daily incidence counts (day 0 to day 60).
<code>population_size</code>	Single numeric value giving the total population size.
<code>recovery_rate</code>	Single numeric value giving the recovery rate parameter.
<code>model_dir</code>	Optional path to the directory containing the trained BiLSTM model and scaler files. If NULL, the package's bundled assets are used.
<code>auto_init</code>	Logical; if TRUE (default), automatically calls <code>init_bilstm_model</code> when the model is not yet loaded.

### Value

Named numeric vector: `ptran`, `crate`, `R0`.

check\_model\_status      *Check model status*

---

**Description**

Check model status

**Usage**

check\_model\_status()

**Value**

A list describing model load status and Python config.

---

check\_python\_setup      *Check Python and package installation status*

---

**Description**

Reports whether Python is available, which package-managed Python target is in use, and whether each required Python package is importable.

**Usage**

check\_python\_setup()

**Value**

A list with Python runtime details and package status.

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cleanup\_model            *Unload the model from memory*

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**Description**

Unload the model from memory

**Usage**

cleanup\_model()

**Value**

Invisibly TRUE on success.

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`estimate_sir_parameters`*Estimate SIR Parameters from 61-day incidence*

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**Description**

Estimate SIR Parameters from 61-day incidence

**Usage**

```
estimate_sir_parameters(daily_cases, population_size, recovery_rate)
```

**Arguments**

`daily_cases` Numeric vector of length 61 containing daily incidence counts for days 0 to 60.  
`population_size` Single numeric value giving the total population size used in the SIR model.  
`recovery_rate` Single numeric value giving the recovery rate parameter of the SIR model.

**Value**

Named numeric vector: `ptran`, `crate`, `R0`.

---

`init_bilstm_model`*Initialize BiLSTM Model for SIR Parameter Estimation*

---

**Description**

Loads the trained BiLSTM model and associated scaler objects into memory. Requires that Python dependencies have been set up via [setup\\_python\\_deps](#).

**Usage**

```
init_bilstm_model(model_dir = NULL, force_reload = FALSE)
```

**Arguments**

`model_dir` Optional path to model directory. Defaults to the package's bundled model files.  
`force_reload` Logical; reload even if already loaded.

**Value**

Invisibly returns TRUE on success.

---

setup\_python\_deps      *Set up Python dependencies for epiworldRcalibrate*

---

### Description

This function declares Python requirements through `\`reticulate\`` using `\`py_require()\`` (uv-backed in `reticulate >= 1.41`), then validates imports for all required modules (numpy, scikit-learn, joblib, PyTorch). Run this once after installing the package. This is kept separate from model functions so that package installation never happens automatically during normal use.

### Usage

```
setup_python_deps(force = FALSE)
```

### Arguments

`force`                      Logical; if TRUE, resets package-managed Python requirements from a fresh R session. Default is FALSE.

### Details

The function performs the following steps:

1. Declares requirements with `reticulate::py_require()`.
2. Initializes Python through `reticulate`'s managed environment.
3. Verifies all packages can be imported.

### Value

Invisibly returns TRUE on success.

### Examples

```
## Not run:  
# First-time setup (run once after installing the package)  
setup_python_deps()  
  
# Force reinstall if something went wrong  
setup_python_deps(force = TRUE)  
  
## End(Not run)
```

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utah_covid_data	<i>Utah COVID-19 epidemic trends</i>
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**Description**

Daily COVID-19 epidemic indicators for the state of Utah, obtained from the Utah Department of Health COVID-19 dashboard.

**Usage**

```
utah_covid_data
```

**Format**

A data frame with 365 rows and 5 variables:

**Date** Date of the observation (Date).

**Daily.Cases** Number of newly reported COVID-19 cases (numeric).

**Smoothed.3.Day.Moving.Average** Smoothed daily cases using a 3-day moving average (numeric).

**X3.Day.Moving.Average** Alternative 3-day moving average of daily cases (numeric).

**Status** Indicator of reporting or epidemic status (character or factor).

**Source**

Utah Department of Health COVID-19 Dashboard.

**Examples**

```
data("utah_covid_data")  
head(utah_covid_data)
```

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