

Package ‘sportsfeatures’

September 14, 2026

Type Package

Title Longitudinal Sports Analytics Asset and Workload Feature Processing

Version 0.2.0

Description A synthetic, longitudinal athletic dataset generated through a transparent, rule-based simulation engine. Captures individual activity sessions across multiple athletes, environmental conditions, and physiological responses. Specifically designed as an alternative to legacy teaching datasets by introducing realistic hierarchical repeated measures, complex two-way covariate interactions, and a deliberate Missing Not At Random (MNAR) tracking mechanism suitable for advanced imputation workflows. Methodologies implemented are based on van Buuren (2018) <[doi:10.1201/9780429492259](https://doi.org/10.1201/9780429492259)> and Bates et al. (2015) <[doi:10.18637/jss.v067.i01](https://doi.org/10.18637/jss.v067.i01)>.

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Depends R (>= 4.1.0)

Imports tibble, mice, modelsummary, lme4

Suggests tidyverse

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get_sportsdata	<i>Access Sports Feature Datasets</i>
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Description

A convenient helper function to quickly load and return the package's internal sports features data assets directly into an active variable.

Usage

```
get_sportsdata(type = c("complete", "missing"))
```

Arguments

type	A character string specifying which dataset variant to load: "complete" (default) or "missing".
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Value

A tibble/data.frame containing the requested sports feature dataset.

Examples

```
# Get the clean complete dataset
clean_data <- get_sportsdata(type = "complete")

# Get the dataset containing systematic missingness
missing_data <- get_sportsdata(type = "missing")
```

sports_features	<i>Comprehensive Sports Features Dataset</i>
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Description

Comprehensive Sports Features Dataset

Usage

```
sports_features
```

Format

A tibble or data frame with 42 variables describing athlete sessions and performance metrics:

session_id Unique alphanumeric identifier for each training session.

athlete_id Unique alphanumeric identifier for each athlete.

datetime Timestamp of when the training session occurred.

activity_type Type of exercise performed (e.g., running, cycling, swimming).

region Geographical area where the session took place.

distance_km Total distance covered during the session in kilometers.

weather_type Weather condition during the session (e.g., sunny, rainy, cloudy).

temperature_c Ambient outdoor temperature in degrees Celsius.

personal_status Pre-activity physical or mental status reported by the athlete.

is_group_activity Logical indicator (TRUE/FALSE) if the session was done with a group.

gender Categorical gender of the athlete.

age Age of the athlete in years.

base_fitness Baseline fitness score of the athlete.

base_speed Baseline average speed capability of the athlete.

base_stamina Baseline stamina level of the athlete.

base_weight Baseline body weight of the athlete in kilograms.

resting_heart_rate Baseline resting heart rate in beats per minute (bpm).

device_type Type of tracking device used during the session.

speed_kmh Average speed maintained throughout the session in km/h.

duration_min Total duration of the training session in minutes.

heart_rate_avg Average heart rate monitored during the session in bpm.

calories_burned Estimated total energy expenditure in kilocalories (kcal).

exhaustion_level Subjective exhaustion level reported after the session.

hydration_status Hydration level (%) recorded during or after the session.

fatigue_score Calculated post-activity fatigue accumulation score.

aerobic_contribution_pct Estimated percentage contribution of the aerobic energy system to total session workload.

anaerobic_contribution_pct Estimated percentage contribution of the anaerobic energy system to total session workload.

energy_system Categorical classification of session effort (Aerobic dominant, Mixed, or Anaerobic dominant).

vo2_session_ml_kg_min Estimated oxygen consumption rate during the session in mL/kg/min.

vo2max_est_ml_kg_min Estimated maximal oxygen uptake potential of the athlete in mL/kg/min.

vo2_utilisation Normalises aerobic demand relative to VO2max; quantifies session intensity as a fraction of physiological capacity.

efficiency_index Captures cardiovascular economy by relating oxygen uptake to heart rate; used to assess aerobic efficiency and readiness.

hr_reserve Represents net cardiovascular elevation above resting state; proxy for internal load and autonomic strain.

aerobic_efficiency Indicates aerobic contribution per unit heart rate; evaluates aerobic system utilisation and metabolic economy.

fatigue_per_km Normalises fatigue accumulation by distance; models workload-adjusted fatigue dynamics.

athlete_mean_fatigue Chronic fatigue baseline; separates stable athlete-level fatigue differences from session-level variation.

fatigue_deviation Within-athlete centred fatigue; isolates session-specific deviations from an athlete's personal fatigue norm.

athlete_mean_distance Chronic volume baseline; captures habitual training load differences between athletes.

distance_centered Within-athlete centred distance; models session-specific deviations from typical training volume.

pace_min_km Represents external speed demand; used to model performance intensity and pacing strategy.

calories_per_km Normalises metabolic cost by distance; quantifies energetic efficiency and workload economy.

calories_per_min Represents metabolic burn rate; models internal metabolic intensity independent of distance.

Details

A rich, synthetic sports analytics dataset containing tracking metrics, environmental contexts, physiological markers, and performance data for athletes.

Source

Synthesized sports features analytics framework.

Examples

```
library(tidyverse)
library(lme4)

# Load the package data
data("sports_features")

# Downsample data for the example to ensure fast execution time (< 2.5s)
demo_data <- head(sports_features, 500)

# -----
# DEMO 1: Linear Regression (Fixed Effects)
# Predicting fatigue score based on workload metrics
# -----
```

```
lm_model <- lm(fatigue_score ~ distance_km + duration_min + speed_kmh + temperature_c,
              data = demo_data)

summary(lm_model)

# -----
# DEMO 2: Linear Mixed-Effects Model (Hierarchical MML)
# Controlling for variation across individual athletes (athlete_id)
# -----
mml_model <- lmer(fatigue_score ~ distance_km + duration_min + speed_kmh + temperature_c +
                 (1 | athlete_id),
                 data = demo_data)
summary(mml_model)
```

sports_features_missing

Comprehensive Sports Features Dataset (With Missing Values)

Description

Comprehensive Sports Features Dataset (With Missing Values)

Usage

sports_features_missing

Format

A tibble or data frame with 42 variables containing structured missing values.

Details

A variant of the core sports analytics dataset containing structured missingness (NA values) across performance tracking columns to demonstrate imputation workflows.

Source

Synthesized sports features analytics framework.

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