

Package: R2camtrapdp (via r-universe)

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Type Package

Title Convert Camera Trap Dataset to 'Camtrap DP'

Version 2.0.0

Description Builds Camera Trap Data Packages ('Camtrap DP') from arbitrary spreadsheets in a schema-driven way: table structure, types, constraints and relations are read from the 'Frictionless' table schemas of the requested 'Camtrap DP' version, so any version and custom columns are handled automatically. Provides validation against the schemas and an optional bridge to the 'frictionless' 'Python' framework. The 'Camtrap DP' standard is described in Bubnicki et al. (2023) <doi:10.1002/rse2.374>.

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Adep

Example acoustic deployment field-notebook

Description

Example deployment notebook for an acoustic (audio) survey, used in the acoustic vignette. One row per device deployment. Coordinates are random points within the inland Izu Peninsula (Shizuoka, Japan).

Usage

Adep

Format

A data frame with 2 rows and 14 variables:

deploymentID Unique identifier of the deployment.

longitude Longitude in decimal degrees (WGS84).

latitude Latitude in decimal degrees (WGS84).

locationID Identifier of the deployment location.

startDate Deployment start date.

startTime Deployment start time.

endDate Deployment end date.

endTime Deployment end time.

deviceID Identifier of the recording device.

deviceModel Manufacturer and model of the recording device.

samplingFrequency Sampling frequency of the recordings (Hz).

bitDepth Bit depth of the recordings.

channels Number of audio channels.

setupBy Name or identifier of the person/organization that deployed the device.

See Also

[Aobs](#)

Aobs

*Example acoustic observation field-notebook***Description**

Example observation notebook for an acoustic (audio) survey, used in the acoustic vignette. One row per observation; the filename column is the audio file from which the media table is derived.

Usage

Aobs

Format

A data frame with 6 rows and 19 variables:

institutionCode Institution code.

collectionCode Collection code.

obsID Observation identifier (within an event).

eventID Identifier of the event the observation belongs to.

deploymentID Identifier of the deployment.

locationID Identifier of the deployment location.

date Date the recording was made.

time Time the recording started.

filename Name of the audio file (used to build media).

duration Duration of the recording file (seconds).

object Recorded object category (animal, none, ...).

class Taxonomic class of the observed organism.

genus Genus of the observed organism.

species Species epithet of the observed organism.

individualCount Number of observed individuals; NA here (not counted from audio).

frequencyLow Lower bound of the call frequency (Hz); approximate values from the bioacoustics literature for each species.

frequencyHigh Upper bound of the call frequency (Hz); approximate values from the bioacoustics literature for each species.

eventStart Date and time at which the event started.

eventEnd Date and time at which the event ended.

See Also

[Adep](#)

create_deployments	<i>Create deployments</i>
--------------------	---------------------------

Description

create_deployments creates a table of deployments.

Usage

```
create_deployments(  
  deploymentID,  
  latitude,  
  longitude,  
  deploymentStart = NULL,  
  deploymentStart_date = NULL,  
  deploymentStart_time = NULL,  
  deploymentEnd = NULL,  
  deploymentEnd_date = NULL,  
  deploymentEnd_time = NULL,  
  locationID = NULL,  
  locationName = NULL,  
  coordinateUncertainty = NULL,  
  setupBy = NULL,  
  cameraID = NULL,  
  cameraModel = NULL,  
  cameraDelay = NULL,  
  cameraHeight = NULL,  
  cameraDepth = NULL,  
  cameraTilt = NULL,  
  cameraHeading = NULL,  
  detectionDistance = NULL,  
  timestampIssues = NULL,  
  baitUse = NULL,  
  featureType = NULL,  
  habitat = NULL,  
  deploymentGroups = NULL,  
  deploymentTags = NULL,  
  deploymentComments = NULL,  
  tz = "Asia/Tokyo"  
)
```

Arguments

deploymentID	Unique identifier of the deployment
latitude	Latitude of the deployment location in decimal degrees, using the WGS84 datum
longitude	Longitude of the deployment location in decimal degrees, using the WGS84 datum

deploymentStart	Date and time at which the deployment was started
deploymentStart_date	Date at which the deployment was started
deploymentStart_time	Time at which the deployment was started
deploymentEnd	Date and time at which the deployment was ended
deploymentEnd_date	Date at which the deployment was ended
deploymentEnd_time	Time at which the deployment was ended
locationID	Identifier of the deployment location
locationName	Name given to the deployment location
coordinateUncertainty	Horizontal distance from the given latitude and longitude describing the smallest circle containing the deployment location
setupBy	Name or identifier of the person or organization that deployed the camera
cameraID	Identifier of the camera used for the deployment
cameraModel	Manufacturer and model of the camera
cameraDelay	Predefined duration after detection when further activity is ignored
cameraHeight	Height at which the camera was deployed
cameraDepth	Depth at which the camera was deployed
cameraTilt	Angle at which the camera was deployed in the vertical plane
cameraHeading	Angle at which the camera was deployed in the horizontal plane
detectionDistance	Maximum distance at which the camera can reliably detect activity
timestampIssues	true if timestamps in the media resource for the deployment are known to have unsolvable issues
baitUse	true if bait was used for the deployment
featureType	Type of the feature associated with the deployment
habitat	Short characterization of the habitat at the deployment location
deploymentGroups	Deployment groups associated with the deployment
deploymentTags	Tags associated with the deployment
deploymentComments	Comments or notes about the deployment
tz	Deployment time zone

Value

A tibble of deployments.

Examples

```
create_deployments(
  deploymentID = c("A01", "A02"),
  latitude = c(35.1, 36.2), longitude = c(139.5, 140.1),
  deploymentStart_date = c("2023-04-01", "2023-04-02"),
  deploymentStart_time = c("09:00:00", "10:30:00"),
  deploymentEnd_date = c("2023-05-01", "2023-05-02"),
  deploymentEnd_time = c("09:00:00", "10:30:00"))
```

 create_media

Create media

Description

create_media creates a table of media.

Usage

```
create_media(
  mediaID,
  deploymentID,
  timestamp = NULL,
  timestamp_date = NULL,
  timestamp_time = NULL,
  filePath,
  filePublic,
  fileMediatype,
  fileName = NULL,
  captureMethod = NULL,
  exifData = NULL,
  favorite = NULL,
  mediaComments = NULL,
  tz = "Asia/Tokyo",
  omitduplicate = TRUE
)
```

Arguments

mediaID	Unique identifier of the media file
deploymentID	Identifier of the deployment the media file belongs to
timestamp	Date and time at which the media file was recorded
timestamp_date	Date at which the media file was recorded
timestamp_time	Time at which the media file was recorded
filePath	URL or relative path to the media file, respectively for externally hosted files or files that are part of the package

filePublic	false if the media file is not publicly accessible
fileMediatype	Mediatype of the media file. Expressed as an IANA Media Type
fileName	Name of the media file
captureMethod	Method used to capture the media file
exifData	EXIF data of the media file
favorite	true if the media file is deemed of interest
mediaComments	Comments or notes about the media file
tz	Time zone of the media file was recorded
omitduplicate	true if duplicate exclusion

Value

A tibble of media.

Examples

```
create_media(
  mediaID = "m1", deploymentID = "A01",
  timestamp_date = "2023-04-01", timestamp_time = "09:05:00",
  filePath = "img/m1.jpg", filePublic = TRUE, fileMediatype = "image/jpeg")
```

create_observations *Create observations*

Description

create_media creates a table of observations.

Usage

```
create_observations(
  observationID,
  deploymentID,
  mediaID = NULL,
  eventID = NULL,
  eventStart = NULL,
  eventStart_date = NULL,
  eventStart_time = NULL,
  eventEnd = NULL,
  eventEnd_date = NULL,
  eventEnd_time = NULL,
  observationLevel,
  observationType,
  cameraSetupType = NULL,
  scientificName = NULL,
```

```

count = NULL,
lifeStage = NULL,
sex = NULL,
behavior = NULL,
individualID = NULL,
individualPositionRadius = NULL,
individualPositionAngle = NULL,
individualSpeed = NULL,
bboxX = NULL,
bboxY = NULL,
bboxWidth = NULL,
bboxHeight = NULL,
classificationMethod = NULL,
classifiedBy = NULL,
classificationTimestamp = NULL,
classificationProbability = NULL,
observationTags = NULL,
observationComments = NULL,
tz = "Asia/Tokyo",
omitduplicate = TRUE
)

```

Arguments

observationID	Unique identifier of the observation
deploymentID	Identifier of the deployment the observation belongs to
mediaID	Identifier of the media file that was classified
eventID	Identifier of the event the observation belongs to
eventStart	Date and time at which the event started
eventStart_date	Date at which the event started
eventStart_time	Time at which the event started
eventEnd	Date and time at which the event ended
eventEnd_date	Date at which the event ended
eventEnd_time	Time at which the event ended
observationLevel	Level at which the observation was classified
observationType	Type of the observation
cameraSetupType	Type of the camera setup action associated with the observation
scientificName	Scientific name of the observed individual
count	Number of observed individuals
lifeStage	Age class or life stage of the observed individual

sex	Sex of the observed individual
behavior	Dominant behavior of the observed individual
individualID	Identifier of the observed individual
individualPositionRadius	Distance from the camera to the observed individual identified by individualID
individualPositionAngle	Angular distance from the camera view centerline to the observed individual identified by individualID
individualSpeed	Average movement speed of the observed individual identified by individualID
bboxX	Horizontal position of the top-left corner of a bounding box
bboxY	Vertical position of the top-left corner of a bounding box
bboxWidth	Width of a bounding box
bboxHeight	Height of the bounding box
classificationMethod	Method used to classify the observation
classifiedBy	Name or identifier of the person or AI algorithm that classified the observation
classificationTimestamp	Date and time of the classification
classificationProbability	Degree of certainty of the classification
observationTags	Tags associated with the observation
observationComments	Comments or notes about the observation
tz	Time zone of observation
omitduplicate	true if duplicate exclusion

Value

A tibble of observations.

Examples

```
create_observations(
  observationID = "o1", deploymentID = "A01", mediaID = "m1",
  eventStart = "2023-04-01 09:05:00", eventEnd = "2023-04-01 09:05:00",
  observationLevel = "media", observationType = "animal",
  scientificName = "Vulpes vulpes", count = 1L)
```

ctdp-build-table	<i>Build a schema-conformant table from arbitrary input</i>
------------------	---

Description

ctdp_build_table() is the generic, schema-driven path from an arbitrary input spreadsheet to a Camtrap DP table. It (1) applies an optional column mapping, (2) optionally merges separate date/time columns into datetime columns, (3) coerces columns to the schema types, and (4) validates the result against the schema constraints. It works for any Camtrap DP version and for custom columns, because everything is read from the supplied [TableSchema](#).

ctdp-conformance	<i>Frictionless conformance pre-checks (R-side)</i>
------------------	---

Description

The R-side validation in this package normally *trusts* that the supplied table schema is a well-formed Frictionless Table Schema. These helpers add an R-side pre-check of that assumption – catching, before the Python Frictionless step, the kinds of structural problems Frictionless itself rejects (unsupported field type, a constraint that is not valid for a field's type, primary/foreign keys that reference undefined fields, etc.). The authoritative check remains [R6_CamtrapDP](#)'s `validate_frictionless()`.

ctdp-frictionless	<i>Python Frictionless validation (shared internals + validate-only API)</i>
-------------------	--

Description

Helpers to run the Python frictionless validator on a written data package and parse the report. `ctdp_validate_frictionless()` validates an **existing** data package directory **without writing or overwriting** anything (use this when you only want to validate a package that was created elsewhere). The [R6_CamtrapDP](#) method `validate_frictionless()` reuses the same internals but writes the package from the object first (its `write` argument).

ctdp-mapping	<i>Column mapping helpers</i>
--------------	-------------------------------

Description

Map an arbitrary input spreadsheet onto Camtrap DP field names, and combine separate date / time columns into a single datetime column.

ctdp-references *Discover external references inside a schema*

Description

Camtrap DP schemas specify some information not through machine-enforceable Frictionless constraints, but through **URLs**: semantic mappings (`skos:exactMatch` / `skos:broadMatch` / `skos:narrowMatch` to Darwin Core, Audubon Core, Dublin Core, ... terms), reference URLs embedded in field descriptions (e.g. the IANA media-type registry for `fileMediaType`, or method DOIs for `individualSpeed`), and the resource schema / package profile URLs themselves.

These functions surface every such URL so that, when you adopt a new version or a new schema flavor, you do not overlook a specification that is expressed only by reference.

ctdp-validation-report *Validation issue representation and reporting*

Description

A uniform structure for validation issues, whether they are produced by the R-side schema/relation checks or parsed from a Python Frictionless validation report. An "issue table" is a `tibble::tibble` with the columns described in `ctdp_issues()`.

ctdp_apply_mapping *Apply a column mapping to a data frame*

Description

Renames the columns of `df` from the source (spreadsheet) names to Camtrap DP field names. Columns of `df` that are not mentioned in mapping are kept unchanged, so columns that already use Camtrap DP field names pass through.

Usage

```
ctdp_apply_mapping(df, mapping, drop_unmapped = FALSE)
```

Arguments

<code>df</code>	A <code>data.frame</code> / <code>tibble</code> of input data.
<code>mapping</code>	The mapping from source column names to target field names. Accepted forms: <ul style="list-style-type: none"> a named character vector where names are source columns and values are target fields, e.g. <code>c(lat = "latitude", lon = "longitude")</code>; a <code>data.frame</code> / <code>tibble</code> with columns <code>source</code> and <code>target</code>.
<code>drop_unmapped</code>	If <code>TRUE</code> , keep only the mapped target columns; if <code>FALSE</code> (default) also keep unmapped columns as-is.

Value

A tibble with renamed columns.

Examples

```
raw <- data.frame(station = c("A01", "A02"), lat = c(35.1, 36.2))
ctdp_apply_mapping(raw, c(station = "deploymentID", lat = "latitude"))
```

ctdp_bind_issues	<i>Row-bind several issue tables</i>
------------------	--------------------------------------

Description

Row-bind several issue tables

Usage

```
ctdp_bind_issues(...)
```

Arguments

... Issue tables (tibbles), or NULLs which are dropped.

Value

A single combined issue tibble.

Examples

```
a <- ctdp_issues(source = "media", constraint = "required",
                severity = "error", message = "missing mediaID")
ctdp_bind_issues(a, ctdp_no_issues())
```

ctdp_build_table	<i>Build and validate a table against a Table Schema</i>
------------------	--

Description

Build and validate a table against a Table Schema

Usage

```
ctdp_build_table(
  schema,
  data,
  mapping = NULL,
  datetime_merges = NULL,
  tz = "Asia/Tokyo",
  source = NULL,
  coerce = TRUE,
  stop_on_error = FALSE
)
```

Arguments

schema	A TableSchema object.
data	A <code>data.frame</code> / tibble of input data.
mapping	Optional column mapping; see ctdp_apply_mapping() .
datetime_merges	Optional list of date/time merge specs. Each element is a list with <code>date_col</code> , <code>time_col</code> , <code>target</code> (and optionally <code>format</code>), applied with ctdp_merge_datetime() after mapping.
tz	Time zone used for temporal coercion / merging.
source	Issue source label; defaults to " <code><resource>.csv</code> ".
coerce	If TRUE, coerce columns to schema types before validating.
stop_on_error	If TRUE, raise an error (with a summary) when the table has validation errors instead of returning them.

Value

A list with elements `data` (the coerced tibble) and `issues` (an issue table from [ctdp_issues\(\)](#)).

Examples

```
sch <- list(name = "deployments",
  fields = list(
    list(name = "deploymentID", type = "string", constraints = list(required = TRUE)),
    list(name = "latitude", type = "number")),
  primaryKey = "deploymentID")
schema <- TableSchema$new("deployments", json = sch)
built <- ctdp_build_table(schema, data.frame(deploymentID = "A01", latitude = 35.1))
built$data
```

ctdp_check_schema	<i>Check that a Table Schema is well-formed per the Frictionless spec</i>
-------------------	---

Description

Verifies the schema structure that Frictionless requires of any Table Schema, independently of the data: non-empty fields, each field with a name and a supported type, constraints that are valid for the field's type, unique field names, and primary/foreign keys that reference defined fields.

Usage

```
ctdp_check_schema(x)
```

Arguments

x A [TableSchema](#) or a parsed table-schema list.

Value

An issue table (see [ctdp_issues\(\)](#)). Constraint codes: schema-structure, schema-type, schema-constraint, schema-key.

Examples

```
sch <- list(name = "deployments",
  fields = list(
    list(name = "deploymentID", type = "string", constraints = list(required = TRUE)),
    list(name = "latitude", type = "number", constraints = list(minimum = -90, maximum = 90))),
  primaryKey = "deploymentID")
ctdp_check_schema(sch)
```

ctdp_is_valid	<i>Did a validation pass (no errors)?</i>
---------------	---

Description

Did a validation pass (no errors)?

Usage

```
ctdp_is_valid(issues)
```

Arguments

issues An issue table.

Value

TRUE if there are no "error" severity rows.

Examples

```
ctdp_is_valid(ctdp_no_issues()) # TRUE
bad <- ctdp_issues(source = "deployments", constraint = "required",
                  severity = "error", message = "missing")
ctdp_is_valid(bad) # FALSE
```

ctdp_issues

Create an issue table

Description

Constructs a tibble of validation issues. All arguments are recycled to a common length. Use [ctdp_no_issues\(\)](#) for an empty table with the right columns.

Usage

```
ctdp_issues(
  source,
  location_type = NA_character_,
  field = NA_character_,
  row = NA_integer_,
  constraint = NA_character_,
  severity = "error",
  message = NA_character_,
  engine = "R",
  value = NA_character_
)
```

Arguments

source	Character. Where the issue lives, e.g. "deployments.csv" or "datapackage.json".
location_type	Character. One of "table", "schema", "relation", "package".
field	Character. Column / field name, or NA.
row	Integer. 1-based data row number, or NA.
constraint	Character. The violated rule, e.g. "required", "unique", "enum", "minimum", "maximum", "minLength", "maxLength", "pattern", "type", "format", "primaryKey", "foreignKey".
severity	Character. "error" or "warning".
message	Character. Human-readable description.
engine	Character. "R" or "frictionless".
value	Character. The offending value(s), when known (e.g. the failing cell value, or the value resolved from the descriptor for a metadata error).

Value

A tibble with one row per issue.

Examples

```
ctdp_issues(source = "deployments", field = "latitude",
            constraint = "required", severity = "error",
            message = "latitude is missing")
```

ctdp_merge_datetime *Combine a date column and a time column into a datetime column*

Description

Generalises the original *_date / *_time merging behaviour. Produces a character column formatted in the Camtrap DP datetime format (%Y-%m-%dT%H:%M:%S%z) so it round-trips cleanly to CSV.

Usage

```
ctdp_merge_datetime(
  df,
  date_col,
  time_col,
  target,
  tz = "Asia/Tokyo",
  format = .ctdp_datetime_format(),
  remove = TRUE
)
```

Arguments

df	A data.frame / tibble.
date_col	Name of the date column.
time_col	Name of the time column.
target	Name of the datetime column to create.
tz	Time zone used to interpret the local date/time.
format	Output datetime format.
remove	If TRUE, drop the source date/time columns.

Value

A tibble with the target datetime column added.

Examples

```
raw <- data.frame(d = c("2023-04-01", "2023-04-02"), t = c("09:00:00", "10:30:00"))
ctdp_merge_datetime(raw, "d", "t", "deploymentStart")
```

ctdp_no_issues	<i>An empty issue table</i>
----------------	-----------------------------

Description

An empty issue table

Usage

```
ctdp_no_issues()
```

Value

A 0-row issue tibble.

Examples

```
ctdp_no_issues()
```

ctdp_parse_frictionless	<i>Parse a Frictionless validation report into an issue table</i>
-------------------------	---

Description

Accepts either a parsed list (from [jsonlite::fromJSON](#)) or a JSON string, supporting both Frictionless v4 and v5 report layouts.

Usage

```
ctdp_parse_frictionless(report, resource_paths = NULL, descriptor = NULL)
```

Arguments

report	A Frictionless report as a list or JSON string.
resource_paths	Optional named character vector mapping resource names to file paths (e.g. <code>c(deployments = "deployments.csv")</code>) used to give a friendlier source. Falls back to the report's own place/name.
descriptor	Optional parsed datapackage. json (list). When supplied, the offending value of a metadata (package) error is resolved from the descriptor using the property path in the error note (e.g. <code>contributors[].email</code>) and placed in the issue's value column. For table/cell errors the failing cell value is used directly.

Value

An issue table (includes a value column with the offending value(s) when known).

Examples

```
# A valid Frictionless report parses to an empty issue table:
ctdp_parse_frictionless(list(valid = TRUE, tasks = list()))
## Not run:
# Typically the report comes from validate_frictionless() / the Python validator:
issues <- ctdp_validate_frictionless("path/to/package")

## End(Not run)
```

ctdp_schema_references

List the external (URL) references declared by a Table Schema

Description

List the external (URL) references declared by a Table Schema

Usage

```
ctdp_schema_references(x)
```

Arguments

x A [TableSchema](#), or a parsed table-schema list (`jsonlite::fromJSON(..., simplifyVector = FALSE)`).

Value

A tibble with columns `resource`, `field` (NA for schema-level), `key` (the JSON key carrying the URL), `category` and `url`. Categories: "semantic-mapping" (`skos:*`), "description-reference", "example", "schema-ref" (the table schema's own URL).

Examples

```
sch <- list(name = "deployments",
           fields = list(
             list(name = "captureMethod", type = "string",
                  "skos:exactMatch" = "http://rs.tdwg.org/dwc/terms/samplingProtocol")))
ctdp_schema_references(sch)
```

`ctdp_semantic_only_fields`

Fields whose meaning is defined only by reference (not machine-validated)

Description

Reports fields that carry a semantic mapping (skos:*) or a reference URL in their description but have **no** enforceable enum or pattern constraint. For these fields Frictionless (and this package) can check the type/format but not the controlled vocabulary, so the values should be checked against the referenced authority manually.

Usage

```
ctdp_semantic_only_fields(x)
```

Arguments

x A [TableSchema](#) or a parsed table-schema list.

Value

A tibble: resource, field, type, reason, urls.

Examples

```
sch <- list(name = "deployments",
  fields = list(
    list(name = "captureMethod", type = "string",
      "skos:exactMatch" = "http://rs.tdwg.org/dwc/terms/samplingProtocol")))
ctdp_semantic_only_fields(sch)
```

`ctdp_summarize_validation`

Summarise an issue table to the console

Description

Prints a grouped summary (errors / warnings per source) followed by a detailed listing showing the offending file, field, row and message.

Usage

```
ctdp_summarize_validation(issues, max_detail = 50L)
```

Arguments

`issues` An issue table from `ctdp_issues()`.
`max_detail` Maximum number of detail rows to print per source.

Value

The issue table, invisibly.

Examples

```
issues <- ctdp_issues(source = "deployments", field = "latitude",
                     constraint = "minimum", severity = "error",
                     message = "latitude below -90", value = "-100")
ctdp_summarize_validation(issues)
```

```
ctdp_validate_frictionless
```

Validate an existing Camtrap DP directory with Python Frictionless

Description

Validates a data package that already exists on disk (e.g. created by another tool or in a previous run) **without writing or overwriting** the `datapackage.json` or the CSV files. This is the validate-only counterpart of the `R6_CamtrapDP$validate_frictionless()` method, which (by default) rewrites the package from the R object before validating.

Usage

```
ctdp_validate_frictionless(
  directory,
  python = "python",
  script = NULL,
  patch_profile = TRUE,
  summarize = TRUE
)
```

Arguments

`directory` Directory containing `datapackage.json` and its CSV files.
`python` Path to the Python interpreter (with `frictionless` installed).
`script` Path to `frictionless_validate.py`; resolved automatically when `NULL` (option, then installed `inst/python/`, then loose-source path).
`patch_profile` If `TRUE`, work around the malformed `$ref` in the Camtrap DP 1.0 profile by validating against a locally corrected copy. This writes two **new** helper files (`camtrap-dp-profile.patched.json`, `datapackage.validate.json`) into `directory` only when the profile is actually malformed; it never modifies `datapackage.json` or the CSVs. Set `FALSE` to keep the directory strictly read-only.
`summarize` Whether to print a summary.

Value

An issue table (see `ctdp_issues()`); engine "frictionless".

Examples

```
## Not run:
# Validate an existing Camtrap DP on disk (needs Python with 'frictionless'):
issues <- ctdp_validate_frictionless("path/to/camtrapdp", python = "python")
ctdp_is_valid(issues)

## End(Not run)
```

datapackageAdata	<i>Example Camtrap DP data package (acoustic)</i>
------------------	---

Description

A pre-built Camtrap DP object (class `camtrapdp`, bioacoustics flavor) created from [Adep](#) and [Aobs](#), for trying out the acoustic workflow without rebuilding from scratch. `media` is derived from the audio file names.

Usage

```
datapackageAdata
```

Format

A `camtrapdp` object (a list with the package metadata and the deployments / media / observations tables under `$data`).

See Also

[datapackageVdata](#), [datapackageIdata](#)

datapackageIdata	<i>Example Camtrap DP data package (multiple camera traps)</i>
------------------	--

Description

A pre-built Camtrap DP object (class `camtrapdp`) created from [Idep](#) and [Iobs](#), for trying out the package without rebuilding from scratch.

Usage

```
datapackageIdata
```

Format

A camtrapdp object (a list with the package metadata and the deployments / media / observations tables under \$data).

See Also

[datapackageVdata](#)

datapackageVdata	<i>Example Camtrap DP data package (single camera trap)</i>
------------------	---

Description

A pre-built Camtrap DP object (class camtrapdp) created from [Vdep](#) and [Vobs](#), for trying out the package without rebuilding from scratch.

Usage

```
datapackageVdata
```

Format

A camtrapdp object (a list with the package metadata and the deployments / media / observations tables under \$data).

References

Originally data can be used from [doi:10.34462/0002000233](https://doi.org/10.34462/0002000233)

See Also

[datapackageIdata](#)

Idep	<i>Example deployment data (multiple camera deployments with image records)</i>
------	---

Description

A small example deployment table used in the package vignettes and examples. One row per camera deployment.

Usage

```
Idep
```

Format

A data frame with 10 rows and 14 variables:

deploymentID Unique identifier of the deployment.

longitude Longitude in decimal degrees (WGS84).

latitude Latitude in decimal degrees (WGS84).

locationID Identifier of the deployment location.

startDate Deployment start date.

startTime Deployment start time.

endDate Deployment end date.

endTime Deployment end time.

cameraID Identifier of the camera.

cameraModel Manufacturer and model of the camera.

Delay Predefined duration after detection during which further activity is ignored (camera delay).

Height Height at which the camera was deployed.

bait Whether bait was used for the deployment.

setupBy Name or identifier of the person/organization that deployed the camera.

See Also

[Iobs](#)

Iobs

Example observation data (image records)

Description

A small example observation table used in the package vignettes and examples. One row per observation.

Usage

Iobs

Format

A data frame with 388 rows and 17 variables:

institutionCode Institution code.

collectionCode Collection code.

obsID Observation identifier (within an event).

eventID Identifier of the event the observation belongs to.

locationID Identifier of the deployment location.

date Date the media file was recorded.

time Time the media file was recorded.

object Recorded object category (raw label).

class Taxonomic class of the observed organism.

genus Genus of the observed organism.

species Species epithet of the observed organism.

individualCount Number of observed individuals.

SDcardID Identifier of the SD card.

filename Name of the media file.

deploymentID Identifier of the deployment the observation belongs to.

eventStart Date and time at which the event started.

eventEnd Date and time at which the event ended.

See Also

[Idep](#)

MetadataProfile	<i>R6 class representing a Camtrap DP package profile (metadata schema)</i>
-----------------	---

Description

Frictionless validates the package *data* against the table schemas, but it validates the *metadata* (the `datapackage.json` descriptor itself) against the package **profile** – a JSON Schema (e.g. `camtrap-dp-profile.json`). `MetadataProfile` reads that profile and extracts the machine-readable metadata requirements: the **required top-level properties** (`contributors`, `project`, `spatial`, `temporal`, `taxonomic`, ...), their types / `minItems`, and the nested required keys of object properties (e.g. `project` requires `title`, `samplingDesign`, ...).

This lets the package check / scaffold the required metadata structure on the R side, instead of only discovering metadata problems when Python Frictionless runs.

Public fields

`version` Camtrap DP version.

`url` Resolved profile URL (if loaded from a URL).

`raw` The raw parsed profile (list).

`required` Character vector of required top-level property names.

`properties` Named list of top-level property definitions.

Methods

Public methods:

- [MetadataProfile\\$new\(\)](#)
- [MetadataProfile\\$property\(\)](#)
- [MetadataProfile\\$property_type\(\)](#)
- [MetadataProfile\\$property_min_items\(\)](#)
- [MetadataProfile\\$property_required\(\)](#)
- [MetadataProfile\\$item_required\(\)](#)
- [MetadataProfile\\$clone\(\)](#)

`MetadataProfile$new()`: Create a MetadataProfile.

Usage:

```
MetadataProfile$new(
  version = "1.0.1",
  url = NULL,
  url_template = NULL,
  local_path = NULL,
  json = NULL,
  cache_dir = file.path(tempdir(), "camtrapdp-schemas"),
  use_cache = TRUE
)
```

Arguments:

`version` Camtrap DP version string.
`url` A fully-resolved profile URL (takes precedence over template).
`url_template` A URL containing <version>.
`local_path` Path to a local profile JSON file.
`json` A pre-parsed profile list.
`cache_dir` Directory used to cache downloaded profiles.
`use_cache` Reuse / store a cached copy.

`MetadataProfile$property()`: Definition of a top-level property.

Usage:

```
MetadataProfile$property(name)
```

Arguments:

`name` Property name.

`MetadataProfile$property_type()`: type of a property.

Usage:

```
MetadataProfile$property_type(name)
```

Arguments:

`name` Property name.

`MetadataProfile$property_min_items()`: minItems of a property (or NULL).

Usage:

```
MetadataProfile$property_min_items(name)
```

Arguments:

name Property name.

MetadataProfile\$property_required(): Nested required keys of an object property (e.g. project).

Usage:

```
MetadataProfile$property_required(name)
```

Arguments:

name Property name.

MetadataProfile\$item_required(): Required keys of each item of an array property (e.g. taxonomic items require scientificName).

Usage:

```
MetadataProfile$item_required(name)
```

Arguments:

name Property name.

MetadataProfile\$clone(): The objects of this class are cloneable with this method.

Usage:

```
MetadataProfile$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Examples

```
## Not run:
# Fetches the package profile for a Camtrap DP version (needs internet):
prof <- MetadataProfile$new(version = "1.0.1")
prof

## End(Not run)
```

R6_CamtrapDP

R6 class representing Camtrap DP (schema-driven)

Description

R6 class holding the Camtrap DP metadata, deployments, media and observations. This is the schema-driven successor of the original R6_CamtrapDP: the field names, types, constraints and relations used when adding tables are read from the Frictionless Table Schemas for the configured Camtrap DP version, so an arbitrary version and custom columns are handled automatically.

The public field names and the method names of the original class are preserved for backward compatibility (`set_deployments()`, `set_media()`, `set_observations()`, `set_custom()`, `add_contributors()`, `add_sources()`, `add_license()`, `set_project()`, `set_st()`, `set_taxon()`, `add_relatedIdentifiers()`, `add_references()`, `out_camtrapdp()`, `import_metadata()`). New, schema-driven capabilities are added as new methods (`get_schema()`, `add_table()`, `check_relations()`, `validate()`, `validate_frictionless()`).

Public fields

resources is the package data resources
profile of the resource
name Identifier of the resource
id A property reserved for globally unique identifiers
created The datetime on which this Data Package was created
title Title of this Data Package
contributors The people or organizations who contributed
description Description of this Data Package
version The version of this Data Package
keywords Keywords of this Data Package
image A URL or Path of an image for this Data Package
homepage A URL for the home on the web related to this Data Package
sources A row sources for this Data Package
licenses The licenses under which the Data Package is provided
bibliographicCitation A bibliographical reference for the resource
project Camera trap project or study
coordinatePrecision Least precise coordinate precision
spatial Spatial coverage, expressed as GeoJSON
temporal Temporal coverage of this Data Package
taxonomic Taxonomic coverage of this Data Package
relatedIdentifiers Identifiers of related resources
references List of references related to this Data Package
directory Directory of this Data Package
data Observation, Media and Deployments tables
schema_urls Named list of <version> URL templates per resource.
schemas Cache of loaded [TableSchema](#) objects, keyed by resource.
profile_schema Cached [MetadataProfile](#) for the package profile.
cache_dir Directory used to cache downloaded schemas.
use_cache Whether to cache / reuse downloaded schemas.
validation Per-table validation issues accumulated during build.

Methods**Public methods:**

- [CamtrapDP\\$new\(\)](#)
- [CamtrapDP\\$update_created\(\)](#)
- [CamtrapDP\\$set_properties\(\)](#)

- `CamtrapDP$get_schema()`
- `CamtrapDP$set_deployments()`
- `CamtrapDP$set_media()`
- `CamtrapDP$set_observations()`
- `CamtrapDP$add_table()`
- `CamtrapDP$set_custom()`
- `CamtrapDP$add_contributors()`
- `CamtrapDP$add_sources()`
- `CamtrapDP$add_license()`
- `CamtrapDP$set_project()`
- `CamtrapDP$set_st()`
- `CamtrapDP$set_taxon()`
- `CamtrapDP$add_relatedIdentifiers()`
- `CamtrapDP$add_references()`
- `CamtrapDP$get_profile()`
- `CamtrapDP$metadata_requirements()`
- `CamtrapDP$check_metadata()`
- `CamtrapDP$check_descriptor()`
- `CamtrapDP$check_camtrap_profile()`
- `CamtrapDP$check_relations()`
- `CamtrapDP$external_references()`
- `CamtrapDP$validate()`
- `CamtrapDP$validate_frictionless()`
- `CamtrapDP$out_camtrapdp()`
- `CamtrapDP$import_metadata()`
- `CamtrapDP$clone()`

`CamtrapDP$new()`: Creates a new instance.

Usage:

```
CamtrapDP$new(tz = "Asia/Tokyo", ...)
```

Arguments:

`tz` Time zone.

`...` Passed to `set_properties()`.

`CamtrapDP$update_created()`: Updates the created timestamp.

Usage:

```
CamtrapDP$update_created(tz = "Asia/Tokyo")
```

Arguments:

`tz` Time zone.

`CamtrapDP$set_properties()`: Sets package properties.

Usage:

```

CamtrapDP$set_properties(
  directory = getwd(),
  name = NULL,
  id = NULL,
  title = NULL,
  description = NULL,
  profile =
    "https://raw.githubusercontent.com/tdwg/camtrap-dp/<version>/camtrap-dp-profile.json",
  version = "1.0.1",
  keywords = NULL,
  image = NULL,
  homepage = NULL,
  bibliographicCitation = NULL,
  coordinatePrecision = NULL,
  schema_urls = NULL,
  cache_dir = NULL,
  use_cache = NULL
)

```

Arguments:

directory Directory of datapackage.

name Identifier of the resource.

id Globally unique identifier.

title Title of this Data Package.

description Description of this Data Package.

profile Profile of the resource (<version> template).

version The Camtrap DP version.

keywords Keywords.

image Image URL/path.

homepage Homepage URL.

bibliographicCitation Bibliographic reference.

coordinatePrecision Coordinate precision.

schema_urls Optional named list of <version> schema URL templates.

cache_dir Optional directory to cache schemas.

use_cache Whether to cache / reuse downloaded schemas.

CamtrapDP\$get_schema(): Load (and cache) the [TableSchema](#) for a resource at the configured version.

Usage:

```

CamtrapDP$get_schema(
  resource,
  schema_url = NULL,
  local_path = NULL,
  json = NULL,
  refresh = FALSE
)

```

Arguments:

resource Resource name, e.g. "deployments".
 schema_url Optional <version> URL template (overrides the default).
 local_path Optional local schema file.
 json Optional pre-parsed schema list.
 refresh If TRUE, reload even if cached on the object.

Returns: A [TableSchema](#).

CamtrapDP\$set_deployments(): Sets deployments. Backward-compatible signature; when the schema is reachable the data is coerced and validated against it.

Usage:

```
CamtrapDP$set_deployments(
  data,
  path = "deployments.csv",
  profile = "tabular-data-resource",
  format = "csv",
  mediatype = "text/csv",
  encoding = "utf-8",
  schema = NULL,
  mapping = NULL,
  datetime_merges = NULL,
  validate = TRUE,
  local_schema = NULL,
  tz = "Asia/Tokyo"
)
```

Arguments:

data Deployments dataset.
 path Path to the data file.
 profile Profile of the resource.
 format Format of the data.
 mediatype Media type.
 encoding Encoding.
 schema <version> URL template for the table schema. If NULL (default), the resource's configured template is used (the camera-trap default, or whatever was set via `set_properties(schema_urls=)`, e.g. a bioacoustics flavor).
 mapping Optional column mapping (see `ctdp_apply_mapping()`).
 datetime_merges Optional date/time merge specs.
 validate Whether to validate against the schema.
 local_schema Optional local schema file path.
 tz Time zone for temporal coercion.

CamtrapDP\$set_media(): Sets media. See `set_deployments()` for shared arguments.

Usage:

```

CamtrapDP$set_media(
  data,
  path = "media.csv",
  profile = "tabular-data-resource",
  format = "csv",
  mediatype = "text/csv",
  encoding = "utf-8",
  schema = NULL,
  mapping = NULL,
  datetime_merges = NULL,
  validate = TRUE,
  local_schema = NULL,
  tz = "Asia/Tokyo"
)

```

Arguments:

data Media dataset.
 path Path to the data file.
 profile Profile of the resource.
 format Format of the data.
 mediatype Media type.
 encoding Encoding.
 schema <version> URL template for the table schema.
 mapping Optional column mapping.
 datetime_merges Optional date/time merge specs.
 validate Whether to validate against the schema.
 local_schema Optional local schema file path.
 tz Time zone for temporal coercion.

CamtrapDP\$set_observations(): Sets observations. See set_deployments() for shared arguments.

Usage:

```

CamtrapDP$set_observations(
  data,
  path = "observations.csv",
  profile = "tabular-data-resource",
  format = "csv",
  mediatype = "text/csv",
  encoding = "utf-8",
  schema = NULL,
  mapping = NULL,
  datetime_merges = NULL,
  validate = TRUE,
  local_schema = NULL,
  tz = "Asia/Tokyo"
)

```

Arguments:

data Observations dataset.
 path Path to the data file.
 profile Profile of the resource.
 format Format of the data.
 mediatype Media type.
 encoding Encoding.
 schema <version> URL template for the table schema.
 mapping Optional column mapping.
 datetime_merges Optional date/time merge specs.
 validate Whether to validate against the schema.
 local_schema Optional local schema file path.
 tz Time zone for temporal coercion.

CamtrapDP\$add_table(): Add an arbitrary (custom or standard) resource table, schema-driven. Unlike `set_custom()` this loads a Table Schema, applies mapping, coerces, validates, stores the table in `$data[[name]]` and appends a proper tabular-data resource.

Usage:

```

CamtrapDP$add_table(
  name,
  data,
  mapping = NULL,
  datetime_merges = NULL,
  schema_url = NULL,
  local_schema = NULL,
  schema_json = NULL,
  path = NULL,
  description = NULL,
  profile = "tabular-data-resource",
  format = "csv",
  mediatype = "text/csv",
  encoding = "utf-8",
  validate = TRUE,
  tz = "Asia/Tokyo"
)
  
```

Arguments:

name Resource name.
 data Dataset.
 mapping Optional column mapping.
 datetime_merges Optional date/time merge specs.
 schema_url Optional <version> URL template for the schema.
 local_schema Optional local schema file path.
 schema_json Optional pre-parsed schema list.
 path Output CSV path (defaults to <name>.csv).
 description Optional resource description.
 profile Resource profile.

format Resource format.
mediatype Resource media type.
encoding Resource encoding.
validate Whether to validate against the schema.
tz Time zone for temporal coercion.

CamtrapDP\$set_custom(): Sets a custom data resource (original behaviour preserved).

Usage:

```
CamtrapDP$set_custom(name, description, data)
```

Arguments:

name Name of dataset.
description Description of dataset.
data Custom dataset.

CamtrapDP\$add_contributors(): Adds contributors.

Usage:

```
CamtrapDP$add_contributors(contrib_table)
```

Arguments:

contrib_table data frame of contributors (title, email, path, role, organization).

CamtrapDP\$add_sources(): Add a source.

Usage:

```
CamtrapDP$add_sources(title, path = NULL, email = NULL, version = NULL)
```

Arguments:

title Title of source.
path Path or URL to the source.
email An email address.
version The version of the source.

CamtrapDP\$add_license(): Add a license.

Usage:

```
CamtrapDP$add_license(name, scope, path = NULL, title = NULL)
```

Arguments:

name Name of license.
scope Scope ("data" or "media").
path URL/path to the license details.
title Title of license.

CamtrapDP\$set_project(): Sets the project.

Usage:

```

CamtrapDP$set_project(
  title,
  samplingDesign,
  captureMethod,
  individualAnimals,
  observationLevel,
  id = NULL,
  acronym = NULL,
  description = NULL,
  path = NULL
)

```

Arguments:

title Title of project.
samplingDesign Sampling design.
captureMethod Capture method.
individualAnimals Logical: individuals recognised?
observationLevel Observation level.
id Project id.
acronym Project acronym.
description Project description.
path Project website.

CamtrapDP\$set_st(): Sets spatial and temporal coverage from the deployments.

Usage:

```
CamtrapDP$set_st()
```

CamtrapDP\$set_taxon(): Sets taxonomic coverage from the observations. The Camtrap DP taxonomic block requires a *taxonID* (e.g. a GBIF / IUCN identifier or URI), which is looked up with *taxadb*; *taxadb* is therefore a required dependency of the package (loaded with it, as in previous versions). Names that cannot be matched get *taxonID* = NA (omitted from the output rather than a bogus <uri>NA). A *warning()* is emitted for *scientificName* values with unnecessary whitespace and for names with no *taxonID* in the chosen database.

Usage:

```
CamtrapDP$set_taxon(taxonDB = "gbif")
```

Arguments:

taxonDB Taxon database passed to *taxadb*: "gbif" (default), "itis" or "ncbi".

CamtrapDP\$add_relatedIdentifiers(): Adds a relatedIdentifier.

Usage:

```

CamtrapDP$add_relatedIdentifiers(
  relationType,
  relatedIdentifier,
  relatedIdentifierType,
  resourceTypeGeneral = NULL
)

```

Arguments:

relationType Type of relation.
 relatedIdentifier Related identifier.
 relatedIdentifierType Type of related identifier.
 resourceTypeGeneral General type of the related resource.

CamtrapDP\$add_references(): Adds references.

Usage:

CamtrapDP\$add_references(reference)

Arguments:

reference Reference of data.

CamtrapDP\$get_profile(): Load (and cache) the [MetadataProfile](#) for the package profile (the JSON Schema that Frictionless validates datapackage.json against). Uses self\$profile (set by set_properties()), so it follows the configured version / flavor.

Usage:

CamtrapDP\$get_profile(refresh = FALSE)

Arguments:

refresh Reload even if cached.

Returns: A [MetadataProfile](#).

CamtrapDP\$metadata_requirements(): The metadata requirements derived from the package profile: which top-level properties are required, their type, nested required keys, the method that creates each, and whether it is currently set.

Usage:

CamtrapDP\$metadata_requirements()

Returns: A tibble (property, required, type, sub_required, item_required, set_with, currently_set).

CamtrapDP\$check_metadata(): Validate the current metadata against the package profile's required structure (a fast R-side counterpart to the profile validation that Frictionless performs). Reports missing required top-level properties and missing nested/required item keys.

Usage:

CamtrapDP\$check_metadata(summarize = TRUE)

Arguments:

summarize Print a summary.

Returns: An issue table (see [ctdp_issues\(\)](#)).

CamtrapDP\$check_descriptor(): Pre-check that the package descriptor and its table schemas conform to the Frictionless specification, before the authoritative Python Frictionless step. Checks the package structure (non-empty resources; each resource has name and path/data; unique names; profile set) and the well-formedness of every loaded / inline table schema (ctdp_check_schema()). Optionally runs a full JSON Schema validation of the written descriptor when jsonschema is given and the jsonvalidate package is installed.

Usage:

```
CamtrapDP$check_descriptor(
  check_schemas = TRUE,
  jsonschema = NULL,
  summarize = TRUE
)
```

Arguments:

`check_schemas` Also check each table schema's well-formedness.

`jsonschema` Optional path/URL to a JSON Schema to validate the serialized descriptor against (requires the `jsonvalidate` package).

`summarize` Print a summary.

Returns: An issue table (see `ctdp_issues()`).

`CamtrapDP$check_camtrap_profile()`: Warn if the package profile is not a Camtrap DP profile. A package can be a valid Frictionless data package yet not be Camtrap DP form unless its profile is the Camtrap DP profile.

Usage:

```
CamtrapDP$check_camtrap_profile(summarize = TRUE)
```

Arguments:

`summarize` Print a summary.

Returns: An issue table (see `ctdp_issues()`).

`CamtrapDP$check_relations()`: Check primary-key and foreign-key relations across the registered tables, driven by each table's Table Schema.

Usage:

```
CamtrapDP$check_relations(summarize = TRUE)
```

Arguments:

`summarize` If TRUE, print a summary of any issues.

Returns: An issue table (see `ctdp_issues()`).

`CamtrapDP$external_references()`: List every external (URL) reference declared across the package: the package profile, each resource's schema URL (or the references inside an inline schema), and the semantic / description-URL references of every loaded table schema. Use this when adopting a new version or schema flavor so that no URL-specified requirement is missed.

Usage:

```
CamtrapDP$external_references()
```

Returns: A tibble (resource, field, key, category, url).

`CamtrapDP$validate()`: Aggregate validation: per-table schema issues collected at build time plus cross-table relation checks. Optionally also runs the Python Frictionless validation.

Usage:

```
CamtrapDP$validate(
  relations = TRUE,
  metadata = FALSE,
  conformance = FALSE,
  frictionless = FALSE,
  summarize = TRUE,
  ...
)
```

Arguments:

`relations` Whether to run `check_relations()`.

`metadata` Whether to run `check_metadata()` (profile-driven).

`conformance` Whether to run the Frictionless conformance pre-checks `check_descriptor()` and `check_camtrap_profile()`.

`frictionless` Whether to also run `validate_frictionless()`.

`summarize` Whether to print a summary.

... Passed to `validate_frictionless()`.

Returns: An issue table.

`CamtrapDP$validate_frictionless()`: Run the Python Frictionless validation on the written data package and parse the report into an issue table.

Usage:

```
CamtrapDP$validate_frictionless(
  directory = NULL,
  python = "python",
  script = NULL,
  write = TRUE,
  patch_profile = TRUE,
  summarize = TRUE
)
```

Arguments:

`directory` Directory containing (or to receive) the data package. Defaults to a temporary directory; the package is written there first.

`python` Path to the Python interpreter.

`script` Path to `frictionless_validate.py`. If NULL, resolved from `getOption("camtrapdp.frictionless_script")` else the installed copy (`system.file("python/frictionless_validate.py", package = "R2camtrapdp")`), else the loose-source `python/frictionless_validate.py`.

`write` Whether to (re)write the data package before validating.

`patch_profile` If TRUE, work around the malformed internal `#$defs/version` in the Camtrap DP 1.0 profile by validating against a locally corrected copy. The written `datapackage.json` keeps the canonical profile URL; only a separate validation descriptor is patched. Has no effect for 1.0.1 / 1.0.2 (their profiles are correct).

`summarize` Whether to print a summary.

Returns: An issue table (engine "frictionless").

`CamtrapDP$out_camtrapdp()`: Exports the `camtrapdp` object and (optionally) writes the data package to disk.

Usage:

```
CamtrapDP$out_camtrapdp(write = FALSE, directory = NULL)
```

Arguments:

write If TRUE, write the data package to directory.

directory Output directory.

Returns: A camtrapdp object (list).

CamtrapDP\$import_metadata(): Imports metadata from a list.

Usage:

```
CamtrapDP$import_metadata(metadata0)
```

Arguments:

metadata0 List of metadata.

CamtrapDP\$clone(): The objects of this class are cloneable with this method.

Usage:

```
CamtrapDP$clone(deep = FALSE)
```

Arguments:

deep Whether to make a deep clone.

Examples

```
# Create the builder (offline):
dp <- R6_CamtrapDP$new(version = "1.0.1", title = "Example", description = "...")
## Not run:
# Registering tables fetches the schema for the chosen version (needs internet):
deployments <- create_deployments(
  deploymentID = "A01", latitude = 35.1, longitude = 139.5,
  deploymentStart_date = "2023-04-01", deploymentStart_time = "09:00:00",
  deploymentEnd_date = "2023-05-01", deploymentEnd_time = "09:00:00")
dp$set_deployments(deployments)
dp$check_relations()
dp$out_camtrapdp(write = TRUE, directory = tempfile())

## End(Not run)
```

TableSchema

R6 class representing a Frictionless Table Schema

Description

TableSchema loads a Frictionless Table Schema (such as the Camtrap DP deployments / media / observations table schemas) from a URL, a local file, or an in-memory list, and exposes everything needed to build and validate a data table against it: field names and types, the primary key, foreign keys, missing-value tokens, and per-field constraints (required, unique, enum, minimum, maximum, minLength, maxLength, pattern, type, format).

Because the structure is read from the schema itself, an arbitrary Camtrap DP version and any custom / extra columns are handled automatically: any field present in the supplied schema participates in validation.

Public fields

resource Resource name, e.g. "deployments".
 version Camtrap DP version used to resolve the URL.
 url Resolved schema URL (if loaded from a URL).
 name Schema name.
 title Schema title.
 description Schema description.
 fields Named list of field definitions keyed by field name.
 field_order Character vector of field names, in schema order.
 primaryKey Character vector naming the primary key field(s).
 foreignKeys List of foreign-key definitions.
 missingValues Character vector of missing-value tokens.
 raw The raw parsed schema (list).

Methods**Public methods:**

- [TableSchema\\$new\(\)](#)
- [TableSchema\\$field_names\(\)](#)
- [TableSchema\\$field\(\)](#)
- [TableSchema\\$required_field_names\(\)](#)
- [TableSchema\\$field_type\(\)](#)
- [TableSchema\\$requirements\(\)](#)
- [TableSchema\\$empty_table\(\)](#)
- [TableSchema\\$coerce\(\)](#)
- [TableSchema\\$external_references\(\)](#)
- [TableSchema\\$semantic_only_fields\(\)](#)
- [TableSchema\\$check_schema\(\)](#)
- [TableSchema\\$validate\(\)](#)
- [TableSchema\\$clone\(\)](#)

`TableSchema$new()`: Create a TableSchema.

Usage:

```

TableSchema$new(
  resource = NULL,
  version = "1.0.1",
  url_template = NULL,
  local_path = NULL,
  json = NULL,
  cache_dir = file.path(tempdir(), "camtrapdp-schemas"),
  use_cache = TRUE
)

```

Arguments:

resource Resource name (used to pick a default URL template and to label issues), e.g. "deployments".
 version Camtrap DP version string, e.g. "1.0.1".
 url_template URL containing the <version> placeholder. If NULL and resource is one of the standard tables, a default template is used.
 local_path Path to a local schema JSON file. Takes precedence over the URL.
 json A pre-parsed schema list. Takes precedence over local_path.
 cache_dir Directory used to cache downloaded schemas.
 use_cache If TRUE, reuse a cached copy when present and cache new downloads.

TableSchema\$field_names(): Field names in schema order.

Usage:

TableSchema\$field_names()

TableSchema\$field(): Get a single field definition by name.

Usage:

TableSchema\$field(name)

Arguments:

name Field name.

TableSchema\$required_field_names(): Names of fields whose constraints\$required is TRUE.

Usage:

TableSchema\$required_field_names()

TableSchema\$field_type(): Type of a field ("string", "number", ...).

Usage:

TableSchema\$field_type(name)

Arguments:

name Field name.

TableSchema\$requirements(): A tidy summary of the schema's requirements: one row per field with its type, format, and constraints (required, unique, enum, minimum, maximum, pattern). Works for any version / flavor.

Usage:

TableSchema\$requirements()

Returns: A tibble.

TableSchema\$empty_table(): Create an empty (0-row) tibble shell with one correctly typed column per schema field, in schema order.

Usage:

TableSchema\$empty_table()

Returns: A tibble with 0 rows.

`TableSchema$coerce()`: Coerce a data frame to the schema. The result contains **every** schema field, in schema order: present columns are cast to the schema type (date/datetime/time formatted as canonical strings) and fields absent from the input are added as typed NA columns (Camtrap DP CSVs are expected to carry all schema columns). Columns not present in the schema are kept after the schema columns (custom columns) and a warning is emitted listing them.

Usage:

```
TableSchema$coerce(df, tz = "Asia/Tokyo", complete = TRUE)
```

Arguments:

`df` A data.frame / tibble.

`tz` Time zone used when formatting date/datetime values supplied as POSIXt / Date.

`complete` If TRUE (default), include all schema fields, filling absent ones with typed NA. If FALSE, keep only the supplied columns.

Returns: A tibble.

`TableSchema$external_references()`: List the external (URL) references this schema declares (semantic skos:* mappings, reference URLs in field descriptions, the schema URL itself). See [ctdp_schema_references\(\)](#).

Usage:

```
TableSchema$external_references()
```

`TableSchema$semantic_only_fields()`: List fields whose meaning is defined only by reference (a semantic mapping or a description URL) and which therefore cannot be fully validated against a controlled vocabulary. See [ctdp_semantic_only_fields\(\)](#).

Usage:

```
TableSchema$semantic_only_fields()
```

`TableSchema$check_schema()`: Check that this schema is a well-formed Frictionless Table Schema (supported types, constraints valid for each type, keys reference defined fields). See [ctdp_check_schema\(\)](#).

Usage:

```
TableSchema$check_schema()
```

`TableSchema$validate()`: Validate a data frame against the schema constraints.

Usage:

```
TableSchema$validate(
  df,
  source = paste0(self$resource %||% self$name, ".csv"),
  raw = NULL
)
```

Arguments:

`df` A data.frame / tibble (ideally already passed through `$coerce()`).

`source` Label used as the issue source (e.g. "deployments.csv").

`raw` Optional pre-coercion data (the original input passed to `$coerce()`). When supplied, values that were present in `raw` but became NA during coercion – i.e. type-invalid entries such as a non-numeric string in a number field – are reported as type errors instead of silently vanishing. [ctdp_build_table\(\)](#) passes this automatically.

Returns: An issue table (see `ctdp_issues()`).

`TableSchema$clone()`: The objects of this class are cloneable with this method.

Usage:

```
TableSchema$clone(deep = FALSE)
```

Arguments:

`deep` Whether to make a deep clone.

Examples

```
# Build from an in-memory schema (offline):
sch <- list(name = "deployments",
  fields = list(
    list(name = "deploymentID", type = "string", constraints = list(required = TRUE)),
    list(name = "latitude", type = "number")),
  primaryKey = "deploymentID")
schema <- TableSchema$new("deployments", json = sch)
schema$field_names()
schema$required_field_names()
## Not run:
# Or fetch the official schema for a Camtrap DP version (needs internet):
TableSchema$new("deployments", version = "1.0.1")

## End(Not run)
```

Vdep

Example single camera-trap deployment data (video)

Description

Example deployment data for a single camera trap (at NIES, Japan), used in the single-camera vignette. One row.

Usage

Vdep

Format

A data frame with 1 row and 14 variables:

deploymentID Unique identifier of the deployment.

longitude Longitude in decimal degrees (WGS84).

latitude Latitude in decimal degrees (WGS84).

locationID Identifier of the deployment location.

startDate Deployment start date.

startTime Deployment start time.
endDate Deployment end date.
endTime Deployment end time.
cameraID Identifier of the camera.
cameraModel Manufacturer and model of the camera.
Delay Camera delay.
Height Height at which the camera was deployed.
bait Whether bait was used.
setupBy Name or identifier of the person/organization that deployed the camera.

References

Originally data can be used from [doi:10.34462/0002000233](https://doi.org/10.34462/0002000233)

See Also

[Vobs](#)

Vobs

Example single camera-trap observation data (video)

Description

Example observation data for the [Vdep](#) single camera-trap deployment, used in the single-camera vignette. One row per observation; `filename` is the video file from which the `media` table is built.

Usage

Vobs

Format

A data frame with 38 rows and 13 variables:

institutionCode Institution code.
collectionCode Collection code.
videoID Video identifier.
locationID Identifier of the deployment location.
date Date the video was recorded.
time Time the video was recorded.
object Recorded object category.
class Taxonomic class of the observed organism.
genus Genus of the observed organism.

species Species epithet of the observed organism.

individualCount Number of observed individuals.

SDcardID Identifier of the SD card.

filename Name of the video file (used to build media).

References

Originally data can be used from [doi:10.34462/0002000233](https://doi.org/10.34462/0002000233)

See Also

[Vdep](#)

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