

# Package ‘standardizeSnapshot’

January 11, 2023

**Title** Standardize and clean Snapshot data

**Version** 1.1.0

**Description** standardizeSnapshot is a R package to standardize camera trap records files from the Snapshot Safari project. Snapshot Safari data comes in different standards, following the method that was used to classify pictures (Zooniverse, TrapTagger or Digikam). This package allows to standardize all data sources to a unique file format and then cleans the files to homogenize records.

**Depends** R (>= 3.4.3)

**License** GPL-3

**Encoding** UTF-8

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**VignetteBuilder** knitr

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add_location_prefix	<i>Add location prefix</i>
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## Description

Adds a prefix to a set of cameras, previously verifying that the prefix is not in the camera name.

## Usage

```
add_location_prefix(cameras, locations, logger = NA)
```

## Arguments

cameras	a character vector of camera names
locations	a character vector of locations (must be the same length as cameras)
logger	a log4r logger object if you want logging (can be created with <code>create_logger</code> ), else NA.

## Value

A character vector of the same length as `cameras` where each value is prefixed with the corresponding value of `locations` (in the same order). The function will not double the prefix in case it was already present.

## Examples

```
cameras <- c("A01", "B01", "KAR_A01")
locations <- c("KAR", "KAR", "KAR")
add_location_prefix(cameras, locations)
```

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clean_cameras	<i>Clean cameras</i>
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---

## Description

Standardize cameras names

## Usage

```
clean_cameras(
  cameras,
  locations,
  classifiers,
  silence_warnings = FALSE,
  logger = NA
)
```

## Arguments

cameras	Cameras vector
locations	locations vector
classifiers	Classifier vector. If the classifier is NULL, the function will apply all Zooniverse corrections.
silence_warnings	Should a warning be displayed when locationID is NA?
logger	a log4r logger object if you want logging (can be created with create_logger), else NA.

## Details

For all data: will add the location prefix.

For TrapTagger data:

- if the location code is KHO: will remove the dash in the camera name (e.g KHO\_E\_A01 -> KHO\_EA01)
- if the location code is SAM: will remove the dash in the camera name (e.g SAM\_B\_A01 -> SAM\_BA01)
- if the location code is SAM: will remove the dash in the camera name (e.g TSW\_L\_A01 -> TSW\_LA01)
- if the location code is PLN: will replace leading PIL\_ with PLN (e.g PIL\_A01 -> PLN\_A01) For Zooniverse data:
- if the location code is KHO, will replace KHOG with E and KHOL with M in cameras (and add location prefix).
- if the location code is DHP, will remove leading D in cameras (and add location prefix).
- if the location code is OVE, will remove leading O in cameras (and add location prefix).

**Value**

a character vector of cameras with the same length as input.

**Examples**

```
cameras <- c("KHO_E_A01", "OC02")
locations <- c("KHO", "OVE")
classifiers <- c("traptagger", "zooniverse")
clean_cameras(cameras, locations, classifiers)
```

---

clean_locations	<i>Clean location</i>
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---

**Description**

Corrects potentially incorrect locations based on the content of cameras. Indeed, for Zooniverse data, cameras in OVE have the locationID DHP and cameras in KHO have the locationID KGA.

**Usage**

```
clean_locations(cameras, locations, logger = NA)
```

**Arguments**

cameras	character vector of cameras
locations	character vector of locations (same length)
logger	a log4r logger object if you want logging (can be created with create_logger), else NA.

**Details**

The code DHP is replaced with OVE if the corresponding camera code starts with 'O'. The code KGA is replaced with KHO if the corresponding camera code starts with 'KHO'. The code PIL is replaced with PLN

**Value**

a character vector of locations with the same length as input.

**Examples**

```
clean_locations(c("OA01", "KH0GA01"), c("DHP", "KGA"))
```

---

clean_species	<i>Standardize species</i>
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**Description**

Eliminate species duplicate names (things like birdofprey and birdsofprey)

**Usage**

```
clean_species(species)
```

**Arguments**

species	vector of species names
---------	-------------------------

**Value**

the vector of species names with standardized names, according to the species names that have already been encountered in the past datasets.

**Examples**

```
species <- c("zebraplains", "zebraburchells", "duiker",  
            "duikercommon", "aardvark", "lionfemale")  
clean_species(species)
```

---

create_logger	<i>Create logger</i>
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**Description**

Initializes a logger with a given logfile.

**Usage**

```
create_logger(  
  my_logfile,  
  threshold = c("INFO", "DEBUG", "WARNING", "ERROR", "FATAL"),  
  console = FALSE  
)
```

**Arguments**

my_logfile	path to the log file (character).
threshold	logging levels to write to the logger (see loglevel documentation in log4r). Defaults to INFO.
console	Write log messages to console?

**Value**

Returns a logger and creates a logfile at the given path. If the path given does not exist, also creates this path.

**Examples**

```
logger <- create_logger(tempfile())
```

---

digikam	<i>Digikam sample data</i>
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---

**Description**

A dataset mimicking typical Digikam data (randomized rows)

**Usage**

```
digikam
```

**Format**

A data frame with 100 rows and 22 variables:

X integer Row names (read by R when reading the csv file)

Station character Camera

Species character Species

DateTimeOriginal character Date and time

Date character Date

Time character Time

delta.time.secs integer Time elapsed since this species was last seen at this camera (seconds).  
Not relevant because rows were permuted.

delta.time.mins double Time elapsed since this species was last seen at this camera (minutes).  
Not relevant because rows were permuted.

delta.time.hours double Time elapsed since this species was last seen at this camera (hours).  
Not relevant because rows were permuted.

delta.time.days double Time elapsed since this species was last seen at this camera (days). Not  
relevant because rows were permuted.

Directory character Local directory where the original photo is

FileName character Name of the original photo on the local storage

EXIF.Model character Exif info

EXIF.Make character Exif info

metadata\_Species character Species (other column)

metadata\_Number character Species count

metadata\_Behaviour character Tagged behaviors  
metadata\_Sex character Tagged sex  
n\_images integer Number of pictures associated to this event?  
metadata\_young\_present character Tagged youngs (Yes/No)  
metadata\_Numberofindividuals logical Tagged number of individuals on the picture  
HierarchicalSubject character Summary column for all metadata\_...

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get_camnames	<i>Get camera names</i>
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## Description

Subsets the locations IDs from the camera names vector.

## Usage

```
get_camnames(cameras, locations, silence_warnings = FALSE, logger = NA)
```

## Arguments

cameras	a character vector of camera names
locations	a character vector of locations (must be the same length as cameras)
silence_warnings	Should a warning be displayed when locationID is NA?
logger	a log4r logger object if you want logging (can be created with create_logger), else NA.

## Value

A vector of camera names without the location prefix (if it was present)

## Examples

```
get_camnames(c("APN_A01", "MAD_B01"), c("APN", "MAD"))
```

---

get\_csv\_files\_and\_folders

*Get csv files and folder*


---

## Description

Get the names of all csv files from the input character vector.

## Usage

```
get_csv_files_and_folders(input, except, basepath, logger = NA)
```

## Arguments

input	a character vector of valid paths: can be files and/or folders
except	files to ignore (optional): all paths for (a part of) which match the exact expression in except will be ignored.
basepath	the part of the path that should be ignored when copying final files (i.e. absolute path inside one's computer that should not be copied in final file.)
logger	a log4r logger object if you want logging (can be created with create_logger), else NA.

## Details

input can be a vector of files and/or folders. If an element of input is a folder, the function will list all files within input; if the element is a file, the function will only list this file.

## Value

A dataframe with columns folders and files, where folders are the paths up to a given file (corresponding to the relative path to the file from basepath), and files are the files paths from folders.

## Examples

```
## Not run:
get_csv_files_and_folders(input = c("path/to/datafolder/KGA",
                                     "path/to/datafolder/ATH_Roll1_Snapshot.csv"),
                          except = "KGA/KGA-KHO_together",
                          basepath = "path/to/datafolder")

## End(Not run)
```



---

get_final_filename	<i>Get final filemane</i>
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---

**Description**

Return the filename from the file columns.

**Usage**

```
get_final_filename(df)
```

**Arguments**

df                      The dataframe to be copied. Must have columns locationID, season, roll.

**Value**

The filename for this file in the format locationID\_Sseason\_Rroll.csv It there are several values in locationID, season or roll, they are separated by a dash in the filename: locationID1-locationID2...

**Examples**

```
zooniverse_std <- standardize_snapshot_df(df = zooniverse, standard = standard)
get_final_filename(zooniverse_std)
```

---

guess_classifier	<i>Guess classifier</i>
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**Description**

Guesses the classifier used to annotate the data based on the column names given in colnames\_df.

**Usage**

```
guess_classifier(colnames_df, logger = NA)
```

**Arguments**

colnames\_df            A character vector of column names.

logger                a log4r logger object if you want logging (can be created with create\_logger), else NA.

**Value**

The classifier: either zooniverse, digikam or traptagger.

**Examples**

```
guess_classifier(colnames(zooniverse))
guess_classifier(colnames(traptagger))
guess_classifier(colnames(digikam))
```

---

read_snapshot_files	<i>Read Snapshot files</i>
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**Description**

Reads files from a vector of files and/or folders into a list of dataframes.

**Usage**

```
read_snapshot_files(input, except, basepath, verbose = TRUE, logger = NA)
```

**Arguments**

input	a character vector of valid paths: can be files and/or folders
except	files to ignore (optional): all paths for (a part of) which match the exact expression in except will be ignored.
basepath	the part of the path that should be ignored when copying final files (i.e. absolute path inside one's computer that should not be copied in final file.)
verbose	Should messages be displayed when reading a folder/file?
logger	a log4r logger object if you want logging (can be created with create_logger), else NA.

**Details**

The files are assumed to be comma or semicolon-separated CSV. If the filename is MAD\_S2\_full\_report\_0-50\_\_agreement\_corrected\_fin.csv, the function only reads the first 26 columns as this file has empty columns.

**Value**

A named list of dataframes. Each element of the list is a dataframe with the contents of a file read from the files list given in input. The names of the list are the file names from the root of input: If the element from input is a file, it is a filename. If the element from input is a folder, it is the relative path from basepath to the file.

**Examples**

```
## Not run:
read_snapshot_files("path/to/datafolder/DHP",
                    basepath = "path/to/datafolder",
                    except = "DHP/DHP+OVE_same_file/*")

## End(Not run)
```

---

standard	<i>Standard column names</i>
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---

**Description**

A dataframe listing the standard column names for the different Snapshot data formats.

**Usage**

```
standard
```

**Format**

A data frame with 39 rows and 4 variables:

```
zooniverse character Expected columns names for Zooniverse data
traptagger character Expected columns names for TrapTagger data
digikam character Expected columns names for Digikam data
new character Columns names for the output standardized data
```

---

standardize_snapshot_df	<i>Standardize dataframe</i>
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---

**Description**

Standardizes a dataframe to the Snapshot standard.

**Usage**

```
standardize_snapshot_df(
  df,
  standard_df,
  locationID_digikam,
  classifier,
  logger = NA,
  verbose = TRUE
)
```

### Arguments

<code>df</code>	The dataframe to standardize. It is expected to match the data format for either Zooniverse, TrapTagger or Digikam processed data (i.e. have column names defined in <code>standard_df</code> ).
<code>standard_df</code>	The standard dataframe to match column names to the new standard. A dataframe with $\geq 2$ columns, one of which must be named <code>zooniverse</code> , <code>digikam</code> or <code>traptagger</code> and another one must be named <code>new</code> .
<code>locationID_digikam</code>	Optional character <code>locationID</code> to use for Digikam data (will display a warning if not provided for Digikam data.) Indeed, for Digikam data, the <code>locationID</code> cannot be inferred from other columns.
<code>classifier</code>	Optional character for the classifier.
<code>logger</code>	a <code>log4r</code> logger object if you want logging (can be created with <code>create_logger</code> ), else NA.
<code>verbose</code>	Should a lot of details be given when executing function?

### Details

Dates and times are standardized to YYYY-MM-DD and HH:MM:SS. The columns `locationID`, `cameraID`, `roll`, `capture` and `season` (if classifier is `zooniverse`) are filled with meaningful information. Species names (`snapshotName`) are standardized to match the existing, known species names. For column `locationID`:

- The location code DHP is replaced with OVE if the corresponding camera code starts with 'O'.
- The location code KGA is replaced with KHO if the corresponding camera code starts with 'KHO'.

For column `cameraID`:

- For TrapTagger data: will remove the leading location code part for all data (eg if `location` is ATH, will change cameras ATH\_A01 -> A01). Also, if the location code is KHO, SAM or TSW: will remove the dash in the camera name (e.g KHO\_E\_A01 -> EA01)
- For Zooniverse data: if the location code is KHO, will replace KHOG with E and KHOL with M in cameras. If the location code is DHP, will remove leading D in `cameraID`. If the location code is OVE, will remove leading O in `cameraID`.
- For column `eventID`: the event ID formatted as `season#cam_site#roll#event_no`.

### Value

The standardized dataframe: it has the same columns as specified in `standard_df$new`, dates and times are standardized and some columns regarding information on the capture are filled. Species names (`snapshotName`) and `cameraID` and `locationID` are standardized (see details). Columns are in the same order as provided in `standard_df$new` and the rows are ordered by ascending camera, date and time.

**Examples**

```
standardize_snapshot_df(zooniverse, standard)
standardize_snapshot_df(traptagger, standard)
standardize_snapshot_df(digikam, standard, locationID_digikam = "MOK")
```

---

```
standardize_snapshot_list
```

*Standardize a list of dataframes*

---

**Description**

Standardizes a list of dataframes to the Snapshot standard.

**Usage**

```
standardize_snapshot_list(
  df_list,
  standard_df,
  classifier,
  logger = NA,
  verbose = TRUE
)
```

**Arguments**

<code>df_list</code>	a list of dataframes.
<code>standard_df</code>	The standard dataframe to match column names to the new standard. A dataframe with $\geq 2$ columns, one of which must be named <code>zooniverse</code> , <code>digikam</code> or <code>traptagger</code> and another one must be named <code>new</code> .
<code>classifier</code>	Optional character or vector of characters for the classifier.
<code>logger</code>	a log4r logger object if you want logging (can be created with <code>create_logger</code> ), else NA.
<code>verbose</code>	Should a lot of details be given when executing function?

**Details**

Dates and times are standardized to YYYY-MM-DD and HH:MM:SS. The columns `locationID`, `cameraID`, `roll`, `capture` and `season` (if classifier is `zooniverse`) are filled with meaningful information. Species names (`snapshotName`) are standardized to match the existing, known species names. For column `locationID`:

- The location code DHP is replaced with OVE if the corresponding camera code starts with 'O'.
- The location code KGA is replaced with KHO if the corresponding camera code starts with 'KHO'.

For column `cameraID`:

- For TrapTagger data: will remove the leading location code part for all data (eg if location is ATH, will change cameras ATH\_A01 -> A01). Also, if the location code is KHO, SAM or TSW: will remove the dash in the camera name (e.g KHO\_E\_A01 -> EA01)
- For Zooniverse data: if the location code is KHO, will replace KHOG with E and KHOL with M in cameras. If the location code is DHP, will remove leading D in cameraID. If the location code is OVE, will remove leading O in cameraID.
- For column eventID: the event ID formatted as season#cam\_site#roll#event\_no.

### Value

The list of standardized dataframes: they the same columns as specified in standard\_df\$new, dates and times are standardized and some columns regarding information on the capture are filled. Species names (snapshotName) and cameraID and locationID are standardized (see details). Columns are in the same order as provided in standard\_df\$new and the rows are ordered by ascending camera, date and time.

### Note

If the file name is Marinmane NR \_record\_table\_0min\_deltaT\_2021-06-10.csv, will apply the location code MAR.

### Examples

```
df_list <- list(zooniverse, digikam, traptagger)

# Digikam data must be named with at least the locationID code
names(df_list)[2] <- "MOK"
standardize_snapshot_list(df_list, standard)

# The name for Digikam data can also a filename starting with the locationID code
names(df_list)[2] <- "MOK_record_table_0min_deltaT_2021-05-07.csv"
standardize_snapshot_list(df_list, standard)
```

---

traptagger

*TrapTagger sample data*


---

### Description

A dataset mimicking typical TrapTagger data (randomized rows)

### Usage

```
traptagger
```

**Format**

A data frame with 100 rows and 9 variables:

Capture\_ID character ID for the capture composed of locationcapture#roll#Cam.Site

Cam.Site character Camera

id integer Picture ID

latitude double Camera latitude (mock data)

longitude double Camera longitude (mock data)

timestamp character Date time

capture\_labels character Species seen on the picture

capture\_sighting\_count integer Species count

capture\_url character Picture url (mock data)

---

write_log_message	<i>Write log message</i>
-------------------	--------------------------

---

**Description**

Writes a log message. If a logger is provided, writes to that logger; if it is NA, displays a message.

**Usage**

```
write_log_message(
  message,
  logger = NA,
  level = c("info", "warn", "error", "debug")
)
```

**Arguments**

message	The message to display/write to the logger
logger	Logger to write to (log4r object of class logger) (defaults to NA)
level	Logging level: either info, warn, debug or error.

**Details**

- if logger is not NA, writes a message to the logger file with the specified level.
- else, doesn't do anything.

**Value**

Will either write the message specified in message to the logger or do nothing if logger is NA.

## Examples

```
logger <- create_logger(tempfile()) # Create a logger
write_log_message("Test", level = "debug", logger = logger)
write_log_message("Test", level = "info", logger = logger)
write_log_message("Test", level = "warn", logger = logger)
write_log_message("Test", level = "error", logger = logger)
```

---

write\_standardized\_df *Write the standardized file*

---

## Description

Writes a file to a given location. If to does not exist, it is created, and if filename is not provided, a default standardized name is chosen.

## Usage

```
write_standardized_df(
  df,
  to,
  filename,
  write = TRUE,
  return_path = ifelse(write, FALSE, TRUE),
  verbose = TRUE,
  logger = NA
)
```

## Arguments

df	The standardized file
to	The target folder to copy data in. If it does not exist, will be created.
filename	The name to give to the file.
write	if TRUE (default), will write the df in the to folder, and df will be named filename.
return_path	Should the path be returned?
verbose	Should messages be displayed when creating a folder/file?
logger	a log4r logger object if you want logging (can be created with create_logger), else NA.

## Value

Writes the file to the folder to/filename. Also returns the path to/filename if return\_path == TRUE.



## Examples

```
std_dat <- standardize_snapshot_df(zooniverse, standard)

# Don't write data
write_standardized_df(std_dat,
                      to = "/home/lnicvert/Documents/PhD/Snapshot/data/2_standardized_data",
                      write = FALSE)
# Don't write data and use custom name
write_standardized_df(std_dat,
                      to = "/home/lnicvert/Documents/PhD/Snapshot/data/2_standardized_data",
                      filename = "myname.csv",
                      write = FALSE)
# Write file to temporary location
write_standardized_df(std_dat,
                      to = tempdir())
```

---

```
write_standardized_list
```

*Write the standardized files*

---

## Description

Writes a list of files to a given location. If to does not exist, it is created, and if filename is not provided, a default standardized name is chosen.

## Usage

```
write_standardized_list(
  df_list,
  filenames,
  to,
  write = TRUE,
  return_path = ifelse(write, FALSE, TRUE),
  verbose = TRUE,
  logger = NA
)
```

## Arguments

df_list	The standardized files list to write. If the list is named, the subdirectory structure in the names will be used to replicate the subdirectiry structure in the destination.
filenames	(Optional) vector of customized file names.
to	Destination folder to write to.
write	Should the result be written or only the path returned?
return_path	Should the path be returned?
verbose	Should messages be displayed when creating a folder/file?
logger	a log4r logger object if you want logging (can be created with create_logger), else NA.

**Value**

Writes the files to/filename1, to/filename2... Also returns the paths to/filename1, to/filename2... if return\_path == TRUE.

**Examples**

```
# Example with a subdirectory structure (inferred from the filenames)
df_list <- list(zooniverse, digikam, traptagger)
names(df_list) <- c("APN/APN.csv", "MOK/MOK.csv", "ATH/ATH.csv")
std_list <- standardize_snapshot_list(df_list, standard)

# Don't write data
write_standardized_list(std_list,
                        to = "/home/lnicvert/Documents/PhD/Snapshot/data/2_standardized_data",
                        write = FALSE)

# Don't write data and use custom name
write_standardized_list(std_list,
                        to = "/home/lnicvert/Documents/PhD/Snapshot/data/2_standardized_data",
                        filenames = c("myname1.csv", "myname2.csv", "myname3.csv"),
                        write = FALSE)

# Write files to temporary location
write_standardized_list(std_list, to = tempdir())

# Without a subdirectory structure (and without list names)
df_list <- list(zooniverse, digikam, traptagger)
names(df_list)[2] <- "MOK"
std_list <- standardize_snapshot_list(df_list, standard)

# Write files to temporary location
write_standardized_list(std_list, to = tempdir())
```

---

zooniverse

*Zooniverse sample data*


---

**Description**

A dataset mimicking typical Zooniverse data (randomized rows)

**Usage**

```
zooniverse
```

**Format**

A data frame with 100 rows and 24 variables:

capture\_id character ID for the capture composed of season#site#roll#capture

season character Zooniverse season code

site character Camera ID

roll integer Roll (index for the camera service)  
capture integer ID for the capture per camera/season/roll  
capture\_date\_local character Date  
capture\_time\_local character Time  
zooniverse\_url\_0 character Url for first photo (mock URL)  
zooniverse\_url\_1 character Url for second photo (mock URL)  
zooniverse\_url\_2 character Url for third photo (mock URL)  
subject\_id integer Internal Zooniverse ID for the capture event (mock ID)  
question\_\_species character Species  
question\_\_count\_max character Maximum count from the volunteers  
question\_\_count\_median character Median count from the volunteers  
question\_\_count\_min character Minimum count from the volunteers  
question\_\_standing double Proportion of users who declared a standing behavior  
question\_\_resting double Proportion of users who declared a resting behavior  
question\_\_moving double Proportion of users who declared a moving behaviour  
question\_\_eating double Proportion of users who declared a eating behaviour  
question\_\_interacting double Proportion of users who declared an interacting behaviour  
question\_\_young\_present double Proportion of users who declared young presents  
question\_\_horns\_visible double Proportion of users who declared horns on the picture  
p\_users\_identified\_this\_species double Proportion of users who identified the consensus  
species  
pielous\_evenness\_index double Pielou evenness index