Package 'REDCapR'

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Title Interaction between R and REDCap

Description Encapsulates functions to streamline calls from R

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Imports httr,plyr,RCurl,stringr

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License GPL-3

LazyData TRUE

VignetteBuilder knitr

Roxygen list(wrap = TRUE)

R topics documented:

Account-class *A Reference Class to represent a bank account.*

Description

A Reference Class to represent a bank account.

Fields

`balance1` A length-one numeric vector

`balance2` A length-one numeric vector

Methods

`withdraw1(x)` Withdraw1 money from account. Allows overdrafts

`withdraw2(x, longParameterName1, longParameterName2, longParameterName3, longParameterName4, lon`
Withdraw2 money from account. Allows overdrafts

create_batch_glossary *Creates a* `data.frame` *that help batching long-running read and writes.*

Description

The function returns a `data.frame` that other functions use to separate long-running read and write REDCap calls into multiple, smaller REDCap calls. The goal is to (1) reduce the chance of time-outs, and (2) introduce little breaks between batches so that the server isn't continually tied up.

Usage

```
create_batch_glossary(row_count, batch_size)
```

Arguments

`row_count`	The number records in the large dataset, before it's split.
`batch_size`	The maximum number of subject records a single batch should contain.

Details

This function can also assist splitting and saving a large `data.frame` to disk as smaller files (such as a .csv). The padded columns allow the OS to sort the batches/files in sequential order.

Value

Currently, a `data.frame` is returned with the following columns,

1. `id`: an `integer` that uniquely identifies the batch, starting at 1.
2. `start_index`: the index of the first row in the batch. `integer`.
3. `stop_index`: the index of the last row in the batch. `integer`.
4. `id_pretty`: a `character` representation of `id`, but padded with zeros.
5. `start_index`: a `character` representation of `start_index`, but padded with zeros.
6. `stop_index`: a `character` representation of `stop_index`, but padded with zeros.
7. `label`: a `character` concatenation of `id_pretty`, `start_index`, and `stop_index_pretty`.

Author(s)

Will Beasley

See Also

See `redcap_read` for a function that uses `create_batch_gloassary`.

Examples

```
library(REDCapR) #Load the package into the current R session.
create_batch_glossary(100, 50)
create_batch_glossary(100, 25)
create_batch_glossary(100, 3)
d <- data.frame(
  recordid = 1:100,
  iv = sample(x=4, size=100, replace=TRUE),
  dv = rnorm(n=100)
)
create_batch_glossary(nrow(d), batch_size=40)
```

REDCapR *REDCapR*

Description

REDCapR

`redcap_column_sanitize` *Sanitize to adhere to REDCap character encoding requirements.*

Description

Replace non-ASCII characters with legal characters that won't cause problems when writing to a REDCap project.

Usage

```
redcap_column_sanitize(d, column_names = colnames(d),
  encoding_initial = "latin1", substitution_character = "?")
```

Arguments

`d`	The `data.frame` containing the dataset used to update the REDCap project. Required.
`column_names`	An array of `character` values indicating the names of the variables to sanitize. Optional.
`encoding_initial`	An array of `character` values indicating the names of the variables to sanitize. Optional.
`substitution_character`	The `character` value that replaces characters that were unable to be appropriatedly matched.

Details

Letters like an accented 'A' are replaced with a plain 'A'.

This is a thin wrapper around `base::iconv()`. The `ASCII//TRANSLIT` option does the actual transliteration work. As of `R 3.1.0`, the OSes use similar, but different, versions to convert the characters. Be aware of this in case you notice slight OS-dependent differences.

Value

A `data.frame` with same columns, but whose character values have been sanitized.

Author(s)

Will Beasley

Examples

```
# Examples are not shown because they require non-ASCII encoding,
#   which makes the package documentation less portable.
```

redcap_project *A* `Reference Class` *to make later calls to REDCap more convenient.*

Description

This `Reference Class` represents a REDCap project. Once some values are set that are specific to a REDCap project (such as the URI and token), later calls are less verbose (such as reading and writing data). The functionality

Fields

`redcap_uri` The URI (uniform resource identifier) of the REDCap project. Required.

`token` token The user-specific string that serves as the password for a project. Required.

Methods

`read(batch_size = 100L, interbatch_delay = 0, records = NULL, records_collapsed = NULL, fields =`
Reads records in a REDCap project.

Examples

```
library(REDCapR) #Load the package into the current R session.
uri <- "https://bbmc.ouhsc.edu/redcap/api/"
token <- "9A81268476645C4E5F03428B8AC3AA7B"
project <- redcap_project$new(redcap_uri=uri, token=token)
dsAll <- project$read()

#Demonstrate how repeated calls are more concise when the token and url aren't always passed.
dsThreeColumns <- project$read(fields=c("record_id", "sex", "age"))$data

idsOfMales <- dsThreeColumns[dsThreeColumns$sex==1, "record_id"]
idsOfMinors <- dsThreeColumns[dsThreeColumns$age < 18, "record_id"]

dsMales <- project$read(records=idsOfMales, batch_size=2)$data
dsMinors <- project$read(records=idsOfMinors)$data
```

redcap_read *Read records from a REDCap project in subsets, and stacks them together before returning a* `data.frame`.

Description

From an external perspective, this function is similar to `redcap_read_oneshot`. The internals differ in that `redcap_read` retrieves subsets of the data, and then combines them before returning (among other objects) a single `data.frame`. This function can be more appropriate than `redcap_read_oneshot` when returning large datasets that could tie up the server.

Usage

```
redcap_read(batch_size = 100L, interbatch_delay = 0, redcap_uri, token,
  records = NULL, records_collapsed = NULL, fields = NULL,
  fields_collapsed = NULL, export_data_access_groups = FALSE,
  raw_or_label = "raw", verbose = TRUE, cert_location = NULL,
  id_position = 1L)
```

Arguments

batch_size	The maximum number of subject records a single batch should contain. The default is 100.
interbatch_delay	The number of seconds the function will wait before requesting a new subset from REDCap. The default is 0.5 seconds.
redcap_uri	The URI (uniform resource identifier) of the REDCap project. Required.
token	The user-specific string that serves as the password for a project. Required.
records	An array, where each element corresponds to the ID of a desired record. Optional.
records_collapsed	A single string, where the desired ID values are separated by commas. Optional.
fields	An array, where each element corresponds a desired project field. Optional.
fields_collapsed	A single string, where the desired field names are separated by commas. Optional.
export_data_access_groups	A boolean value that specifies whether or not to export the "redcap_data_access_group" field when data access groups are utilized in the project. Default is FALSE. See the details below.
raw_or_label	A string (either 'raw' or 'label' that specifies whether to export the raw coded values or the labels for the options of multiple choice fields. Default is 'raw'.
verbose	A boolean value indicating if messages should be printed to the R console during the operation. Optional.
cert_location	If present, this string should point to the location of the cert files required for SSL verification. If the value is missing or NULL, the server's identity will be verified using a recent CA bundle from the cURL website. See the details below. Optional.
id_position	The column position of the variable that unique identifies the subject. This defaults to the first variable in the dataset.

Details

Specifically, it internally uses multiple calls to redcap_read_oneshot to select and return data. Initially, only primary key is queried through the REDCap API. The long list is then subsetted into partitions, whose sizes are determined by the batch_size parameter. REDCap is then queried for all variables of the subset's subjects. This is repeated for each subset, before returning a unified data.frame.

The function allows a delay between calls, which allows the server to attend to other users' requests.

Value

Currently, a list is returned with the following elements,

1. `data`: An R `data.frame` of the desired records and columns.
2. `success`: A boolean value indicating if the operation was apparently successful.
3. `status_codes`: A collection of http status codes, separated by semicolons.
4. `outcome_messages`: A collection of human readable strings indicating the operations' semicolons
5. `records_collapsed`: The desired records IDs, collapsed into a single string, separated by commas.
6. `fields_collapsed`: The desired field names, collapsed into a single string, separated by commas.
7. `elapsed_seconds`: The duration of the function.

Author(s)

Will Beasley

References

The official documentation can be found on the REDCap wiki (https://iwg.devguard.com/trac/redcap/wiki/ApiDocumentation). Also see the 'API Examples' page on the REDCap wiki (https://iwg.devguard.com/trac/redcap/wiki/ApiExamples). A user account is required to access the wiki, which typically is granted only to REDCap administrators. If you do not

The official cURL site discusses the process of using SSL to verify the server being connected to.

Examples

```
## Not run:
library(REDCapR) #Load the package into the current R session.
uri <- "https://bbmc.ouhsc.edu/redcap/api/"
token <- "9A81268476645C4E5F03428B8AC3AA7B"
redcap_read(batch_size=2, redcap_uri=uri, token=token)

## End(Not run)
```

`redcap_read_oneshot` *Read records from a REDCap project.*

Description

This function uses REDCap's API to select and return data.

Usage

```
redcap_read_oneshot(redcap_uri, token, records = NULL,
  records_collapsed = NULL, fields = NULL, fields_collapsed = NULL,
  export_data_access_groups = FALSE, raw_or_label = "raw", verbose = TRUE,
  cert_location = NULL)
```

Arguments

`redcap_uri`	The URI (uniform resource identifier) of the REDCap project. Required.
`token`	The user-specific string that serves as the password for a project. Required.
`records`	An array, where each element corresponds to the ID of a desired record. Optional.
`records_collapsed`	A single string, where the desired ID values are separated by commas. Optional.
`fields`	An array, where each element corresponds a desired project field. Optional.
`fields_collapsed`	A single string, where the desired field names are separated by commas. Optional.
`export_data_access_groups`	A boolean value that specifies whether or not to export the "redcap_data_access_group" field when data access groups are utilized in the project. Default is `FALSE`. See the details below.
`raw_or_label`	A string (either `'raw'` or `'label'` that specifies whether to export the raw coded values or the labels for the options of multiple choice fields. Default is `'raw'`.
`verbose`	A boolean value indicating if `messages` should be printed to the R console during the operation. Optional.
`cert_location`	If present, this string should point to the location of the cert files required for SSL verification. If the value is missing or NULL, the server's identity will be verified using a recent CA bundle from the cURL website. See the details below. Optional.

Details

I like how PyCap creates a 'project' object with methods that read and write from REDCap. However this isn't a style that R clients typically use. I like the logic that it's associated with a particular REDCap project that shouldn't change between calls. As a compromise, I think I'll wrap the uri, token, and cert location into a single `S4` object that's passed to these methods. It will make these calls take less space.

The 'REDCapR' package includes a recent version of the Bundle of CA Root Certificates from the official cURL site. This version is used by default, unless the 'cert_location' parameter is given another location.

If you do not pass in this export_data_access_groups value, it will default to `FALSE`. The following is from the API help page for version 5.2.3: This flag is only viable if the user whose token is being used to make the API request is *not* in a data access group. If the user is in a group, then this flag will revert to its default value.

Value

Currently, a list is returned with the following elements,

1. `data`: An R `data.frame` of the desired records and columns.
2. `success`: A boolean value indicating if the operation was apparently successful.
3. `status_code`: The http status code of the operation.
4. `outcome_message`: A human readable string indicating the operation's outcome.
5. `records_collapsed`: The desired records IDs, collapsed into a single string, separated by commas.

6. `fields_collapsed`: The desired field names, collapsed into a single string, separated by commas.
7. `elapsed_seconds`: The duration of the function.
8. `raw_text`: If an operation is NOT successful, the text returned by REDCap. If an operation is successful, the 'raw_text' is returned as an empty string to save RAM.

Author(s)

Will Beasley

References

The official documentation can be found on the 'API Examples' page on the REDCap wiki (https://iwg.devguard.com/trac/redcap/wiki/ApiExamples). A user account is required.

The official cURL site discusses the process of using SSL to verify the server being connected to.

Examples

```
## Not run:
library(REDCapR) #Load the package into the current R session.
uri <- "https://bbmc.ouhsc.edu/redcap/api/"
token <- "9A81268476645C4E5F03428B8AC3AA7B"
#Return all records and all variables.
ds_all_rows_all_fields <- redcap_read_oneshot(redcap_uri=uri, token=token)$data

#Return only records with IDs of 1 and 3
desired_records_v1 <- c(1, 3)
ds_some_rows_v1 <- redcap_read_oneshot(
   redcap_uri=uri,
   token=token,
   records=desired_records_v1
)$data

#Return only the fields recordid, first_name, and age
desired_fields_v1 <- c("recordid", "first_name", "age")
ds_some_fields_v1 <- redcap_read_oneshot(
   redcap_uri=uri,
   token=token,
   fields=desired_fields_v1
)$data

## End(Not run)
```

`validate_for_write` *Inspect a* `data.frame` *to anticipate problems before writing to a REDCap project.*

Description

This set of functions inspect a `data.frame` to anticipate problems before writing with REDCap's API.

Usage

```
validate_for_write( d )

validate_no_logical( d )

validate_no_uppercase( d )
```

Arguments

d	The data.frame containing the dataset used to update the REDCap project. Required.

Details

All functions listed in the Usage section above inspect a specific aspect of the dataset. The validate_for_read() function executes all these individual validation checks. It allows the client to check everything with one call.

Value

A data.frame, where each potential violation is a row. The two columns are:

1. field_name: The name of the data.frame that might cause problems during the upload.
2. field_index: The position of the field. (For example, a value of '1' indicates the first column, while a '3' indicates the third column.)
3. concern: A description of the problem potentially caused by the field.
4. suggestion: A *potential* solution to the concern.

Author(s)

Will Beasley

Examples

```
d <- data.frame(
  recordid = 1:4,
  flag_logical = c(TRUE, TRUE, FALSE, TRUE),
  flag_Uppercase = c(4, 6, 8, 2)
)
validate_for_write(d = d)
```

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