

Package ‘CytobankAPI’

October 4, 2021

Title Cytobank API Wrapper for R

Version 1.4.0

Description Tools to interface with Cytobank's API via R, organized by various endpoints that represent various areas of Cytobank functionality. Learn more about Cytobank at <https://www.beckman.com/flow-cytometry/software/cytobank-premium>.

Depends R (>= 3.5), curl (>= 2.7), httr (>= 1.2.1)

Imports jsonlite, methods, stats

License GPL-3

LazyData FALSE

RoxygenNote 7.1.1

Suggests knitr, rmarkdown, testthat

VignetteBuilder knitr

Encoding UTF-8

Copyright 2020 Beckman Coulter, Inc.

NeedsCompilation no

Author Qihao Qi [aut, cre],
Stefanie Trop [aut],
Louis Liu [aut]

Maintainer Qihao Qi <qqi@beckman.com>

Repository CRAN

Date/Publication 2021-10-04 08:30:20 UTC

R topics documented:

AdvancedAnalysis-class	2
attachments	3
authentication	6
citrus	7
CITRUS-class	11

compensations	12
DimensionalityReduction-class	13
dimensionality_reduction	14
drop	18
experiments	19
fcs_files	24
flowsom	27
FlowSOM-class	31
gates	33
helper_functions	35
news	36
optSNE-class	36
panels	37
populations	39
sample_tags	40
scales	41
spade	43
SPADE-class	48
statistics	49
tSNE-class	52
UMAP-class	53
users	53
UserSession-class	55
visne	55
viSNE-class	58

Index	60
--------------	-----------

AdvancedAnalysis-class

S4 Advanced Analysis Class

Description

An Advanced Analysis object that is a parent class to all advanced analysis algorithms. This class should never be called explicitly. Its purpose is to act as a parent class for advanced analyses.

Value

An Advanced Analysis object

Slots

`channels` the channels selected for the advanced analysis, this can be either a list of short channel IDs (integer) OR long channel names (character)

`compensation_id` the compensation ID selected for the advanced analysis

`name` the name of the advanced analysis

source_experiment the source experiment ID the advanced analysis is associated with
 status character representing the status of the advanced analysis
 .available_channels the list of available channels based off the [panels.list](#) function
 .available_files the list of available files based off the [fcs_files.list](#) function
 .available_populations the list of available populations based off the [populations.list](#) function

 attachments

Attachment Endpoints

Description

Interact with attachments using these endpoints. Only FCS files can be analyzed in Cytobank, but any file can be uploaded as an attachment. Exported PDFs, statistics, and files also automatically attach themselves to the Experiment they are exported from. [Learn more about attachments in Cytobank.](#)

Usage

```

## S4 method for signature 'UserSession'
attachments.delete(
  UserSession,
  experiment_id,
  attachment_id,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
attachments.download(
  UserSession,
  experiment_id,
  attachment_id,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
attachments.download_zip(
  UserSession,
  experiment_id,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
attachments.list(
  UserSession,

```

```

    experiment_id,
    output = "default",
    timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
attachments.show(
  UserSession,
  experiment_id,
  attachment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
attachments.update(
  UserSession,
  attachment,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
attachments.upload(
  UserSession,
  experiment_id,
  file_path,
  output = "default",
  timeout = UserSession@long_timeout
)

```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
attachment_id	integer representing an attachment ID
timeout	integer representing the request timeout time in seconds [optional]
directory	character representing a specific directory to which the file will be downloaded (optional ending directory slash), if left empty, the default will be the current working directory [optional]
output	character representing the output format [optional] - <i>attachments.list</i> , <i>attachments.show</i> , <i>attachments.update</i> : ("default", "raw")
attachment	dataframe representing an attachment (can retrieve via the <i>attachments.show</i> endpoint)
file_path	character representing a file path

Details

`attachments.delete` Permanently delete an attachment.

`attachments.download` Download an attachment from an experiment.

`attachments.download_zip` Download all attachments as a zip file from an experiment.

`attachments.list` List all attachments from an experiment. Outputs a dataframe [default] or raw list with all fields present.

- *Optional output parameter, specify one of the following:* ("default", "raw")

`attachments.show` Show attachment details from an experiment.

- *Optional output parameter, specify one of the following:* ("default", "raw")

`attachments.update` Update an attachment description from an experiment.

`attachments.upload` Upload an attachment to an experiment.

- *Optional output parameter, specify one of the following:* ("default", "raw")

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: attachments.delete(cyto_session, 22, attachment_id=2)

## Not run: # Download an attachment to the current working directory
attachments.download(cyto_session, 22, attachment_id=2)

# Download an attachment to a new directory
attachments.download(cyto_session, 22, attachment_id=2, directory="/my/new/download/directory/")

## End(Not run)
## Not run: # Download the attachment zip to the current working directory
attachments.download_zip(cyto_session, 22, attachment_id=2)

# Download the attachment zip to a new directory
attachments.download_zip(cyto_session, 22, attachment_id=2, directory="/my/new/download/directory/")

## End(Not run)
## Not run: # Dataframe of all attachments with all fields present
attachments.list(cyto_session, 22)

# Raw list of all attachments with all fields present
attachments.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: attachments.show(cyto_session, 22, attachment_id=2)

## Not run: attachments.update(cyto_session, attachment=cyto_attachment)

## Not run: attachments.upload(cyto_session, 22, file_path="/path/to/my_attachment.txt")
```

authentication	<i>Authentication Endpoints</i>
----------------	---------------------------------

Description

Interact with authentication endpoints. Every call to the Cytobank API must be accompanied by an authentication token. Tokens should be kept secure as they confer access to the data and analyses of an account. Tokens expire after 8 hours by default but this figure may change depending on custom configurations of an Enterprise Cytobank. Use the `authentication.logout` / `authentication.revoke` API endpoints to invalidate one or all tokens for a user account.

Usage

```
authenticate(
  site,
  username = NA,
  password = NA,
  auth_token = NA,
  short_timeout = 30,
  long_timeout = 60,
  timeout = 30
)

## S4 method for signature 'UserSession'
authentication.logout(UserSession, timeout = UserSession@short_timeout)

## S4 method for signature 'UserSession'
authentication.revoke_all_tokens(
  UserSession,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
authentication.revoke_all_tokens_user(
  UserSession,
  user_id,
  timeout = UserSession@short_timeout
)
```

Arguments

site	character representing Cytobank user's site, as in 'site'.cytobank.org. If your Cytobank server does not end in '.org', enter the entire server name, as in 'site.cytobank.cn'.
username	character representing Cytobank user's username or email
password	character representing Cytobank user's password

auth_token	character representing Cytobank user's authentication token (expires in 8 hours)
short_timeout	numeric representing short request timeout times (default = 60s) [optional]
long_timeout	numeric representing long request timeout times (default = 30s) [optional]
timeout	integer representing the request timeout time in seconds [optional]
UserSession	Cytobank UserSession object
user_id	integer representing a Cytobank user's ID

Details

authenticate Authenticate a Cytobank user and returns a Cytobank UserSession object that is passed to all other Cytobank API endpoints.

authentication.logout Logout a Cytobank user.

authentication.revoke_all_tokens Invalidate all existing tokens for the user making this call.

authentication.revoke_all_tokens_user Revoke all tokens for a given user. This endpoint only works for admins of the Cytobank site being accessed.

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: authentication.logout(cyto_session)

## Not run: authentication.revoke_all_tokens(cyto_session)

## Not run: authentication.revoke_all_tokens_user(cyto_session)
```

citrus

CITRUS Endpoints

Description

Interact with CITRUS advanced analyses using these endpoints.

Usage

```
## S4 method for signature 'UserSession,CITRUS'
citrus.copy_settings(
  UserSession,
  citrus,
  output = "default",
  timeout = UserSession@short_timeout
```

```
)

## S4 method for signature 'UserSession,CITRUS'
citrus.delete(UserSession, citrus, timeout = UserSession@short_timeout)

## S4 method for signature 'UserSession,CITRUS'
citrus.download(
  UserSession,
  citrus,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
citrus.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
citrus.new(
  UserSession,
  experiment_id,
  citrus_name,
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,CITRUS'
citrus.rename(
  UserSession,
  citrus,
  citrus_name,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,CITRUS'
citrus.run(
  UserSession,
  citrus,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
citrus.show(
  UserSession,
```



```

    experiment_id,
    citrus_id,
    timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,CITRUS'
citrus.status(
  UserSession,
  citrus,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,CITRUS'
citrus.update(UserSession, citrus, timeout = UserSession@long_timeout)

```

Arguments

UserSession	Cytobank UserSession object
citrus	Cytobank CITRUS object
output	character representing the output format [optional] - <i>citrus.list</i> , <i>citrus.run</i> , <i>citrus.status</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds [optional]
directory	character representing a specific directory to which the file will be downloaded (optional ending directory slash), if left empty, the default will be the current working directory [optional]
experiment_id	integer representing an experiment ID
citrus_name	character representing a new CITRUS name
citrus_id	integer representing a CITRUS ID

Details

`citrus.copy_settings` Copy CITRUS advanced analysis settings from an experiment and returns a CITRUS object.

`citrus.delete` Delete a CITRUS advanced analysis from an experiment.

`citrus.download` Download a CITRUS analysis from an experiment.

`citrus.list` List all CITRUS advanced analyses from an experiment. Outputs a dataframe [default] or list with all fields present.
- *Optional output parameter, specify one of the following*: ("default", "raw")

`citrus.new` Create a new CITRUS advanced analysis from an experiment and returns a CITRUS object.

`citrus.rename` Rename a CITRUS advanced analysis from an experiment and returns a CITRUS object.

`citrus.run` Run a CITRUS advanced analysis from an experiment.

`citrus.show` Show CITRUS advanced analysis details from an experiment and returns a CITRUS object.

`citrus.status` Show the status of a CITRUS advanced analysis from an experiment.

`citrus.update` Update a CITRUS advanced analysis from an experiment and returns the new CITRUS object.

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

# cyto_citrus refers to a CITRUS object that is created from CITRUS endpoints
# examples: citrus.new, citrus.show (see details section for more)

## End(Not run)
## Not run: citrus.copy_settings(cyto_session, citrus=cyto_citrus)

## Not run: citrus.delete(cyto_session, citrus=cyto_citrus)

## Not run: # Download a CITRUS analysis to the current working directory
citrus.download(cyto_session, citrus)

# Download a CITRUS analysis to a new directory
citrus.download(cyto_session, citrus, directory="/my/new/download/directory/")

## End(Not run)
## Not run: # Dataframe of all CITRUS advanced analyses with all fields present
citrus.list(cyto_session, 22)

# Raw list of all CITRUS advanced analyses with all fields present
citrus.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: citrus.new(cyto_session, 22, citrus_name="My new CITRUS analysis")

## Not run: citrus.rename(cyto_session, citrus=cyto_citrus, citrus_name="My updated CITRUS name")

## Not run: citrus.run(cyto_session, citrus=cyto_citrus)

## Not run: citrus.show(cyto_session, 22, citrus_id=2)

## Not run: citrus.status(cyto_session, citrus=cyto_citrus)

## Not run: citrus.update(cyto_session, citrus=cyto_citrus)
```

CITRUS-class	<i>S4 CITRUS Class</i>
--------------	------------------------

Description

A CITRUS object that holds pertinent CITRUS advanced analysis run information, [learn more about CITRUS](#). This class should never be called explicitly. If a user would like to create a new Cytobank CITRUS object, utilize the [citrus.new](#) function, or any other [CITRUS endpoints that return CITRUS objects documented in the 'Details' section](#).

Value

A CITRUS advanced analysis object

Slots

`associated_models` list representing statistical methods used to discover stratifying signatures from clustered data features that explain differences between sample groups, [learn more about CITRUS association models](#)

- choose from the following : ("sam", "pamr" [default], "glmnet")

`attachment_id` numeric representing the CITRUS attachment ID

`cross_validation_folds` numeric representing the regulation threshold, controlling the number of features in the model (only applies to PAM, LASSO), [learn more about CITRUS cross validation folds](#)

`citrus_id` numeric representing the CITRUS analysis ID

`cluster_characterization` character representing the principle for analyzing and quantifying individual samples, [learn more about CITRUS cluster characterization](#)

- choose one of the following : ("abundance" [default], "medians")

`event_sampling_method` character representing the sampling method, [learn more about CITRUS event sampling methods](#)

- choose one of the following : ("equal" [default], "max-per-file")

`events_per_file` numeric representing the number of events taken from each sample

`false_discovery_rate` numeric representing the false discovery rate (only applies to PAM, SAM), [learn more about CITRUS false discovery rate](#)

`file_grouping` numeric dataframe representing which group samples belong to, [learn more about CITRUS file grouping, the core functionality of CITRUS](#)

`minimum_cluster_size` numeric representing the number of nodes, [learn more about CITRUS minimum cluster size](#)

`normalize_scales` logical representing whether or not to normalize channels, [learn more about normalizing CITRUS scales](#)

`plot_theme` character representing the background color of images and figures within the CITRUS results

- choose one of the following : ("white" [default], "black")

population_id dataframe representing a population **gate set ID**
 statistics_channels list representing the statistics channels used for the 'median' cluster characterization, these channels should not be selected for clustering

 compensations

Compensation Endpoints

Description

Interact with compensation endpoints. Get information about compensations stored in Cytobank. For information about file-internal compensation for an individual FCS file, consult the [FCS files endpoints](#). [Learn more about compensation in Cytobank](#).

Usage

```
## S4 method for signature 'UserSession'
compensations.upload_csv(
  UserSession,
  experiment_id,
  file_path,
  timeout = UserSession@long_timeout
)
```

```
## S4 method for signature 'UserSession'
compensations.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)
```

```
## S4 method for signature 'UserSession'
compensations.show(
  UserSession,
  experiment_id,
  compensation_id,
  output = "default",
  timeout = UserSession@short_timeout
)
```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
file_path	character representing a file path
timeout	integer representing the request timeout time in seconds [optional]

output character representing the output format **[optional]**
 - *compensations.list*: ("default", "raw") - *compensations.show*: ("default", "dataframe", "raw") - dataframe: *converts the compensation matrix output to a dataframe*

compensation_id integer representing a compensation ID

Details

`compensations.upload_csv` Upload a compensation CSV to an experiment.

`compensations.list` List all compensations from an experiment. Outputs a formatted list [default] or raw list with all fields present.
 - *Optional output parameter, specify one of the following*: ("default", "raw")

`compensations.show` Show compensation details from an experiment.
 - *Optional output parameter, specify one of the following*: ("default", "dataframe", "raw")
 - dataframe: *converts the compensation matrix output to a dataframe*

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: compensations.upload_csv(cyto_session, 22, file_path="/path/to/my_compensation.csv")

## Not run: # List of all compensations with all fields present, with a compensation matrix dataframe list item
compensations.list(cyto_session, 22)

# Raw list of all compensations with all fields present
compensations.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: # List form of a compensation
compensations.show(cyto_session, 22, compensation_id=2)

# Compensation dataframe only
compensations.show(cyto_session, 22, compensation_id=2, output="dataframe")

## End(Not run)
```

Description

A Dimensionality Reduction object that holds pertinent Dimensionality Reduction advanced analysis run information. This class should never be called explicitly. If a user would like to create a new Cytobank Dimensionality Reduction object, utilize the [dimensionality_reduction.new](#) function, or any other [Dimensionality Reduction endpoints that return Dimensionality Reduction objects documented in the 'Details' section](#).

Value

A Dimensionality Reduction advanced analysis object

Slots

analysis_id numeric representing the Dimensionality Reduction analysis ID
 type character representing the Dimensionality Reduction type (tSNE-CUDA, opt-SNE, UMAP, or viSNE)
 name character the name of the Dimensionality Reduction analysis
 status character representing the status of the Dimensionality Reduction analysis
 source_experiment numeric the source experiment ID the Dimensionality Reduction analysis is associated with
 created_experiment numeric representing the experiment that gets created from the Dimensionality Reduction analysis
 .available_channels the list of available channels based off the [panels.list](#) function
 .available_files the list of available files based off the [fcs_files.list](#) function
 .available_populations the list of available populations based off the [populations.list](#) function

dimensionality_reduction

DimensionalityReduction Endpoints

Description

Interact with DimensionalityReduction advanced analyses using these endpoints.

Usage

```
## S4 method for signature 'UserSession,DimensionalityReduction'
dimensionality_reduction.copy_settings(
  UserSession,
  dimensionality_reduction,
  output = "default",
  timeout = UserSession@short_timeout
)
```

```
## S4 method for signature 'UserSession,DimensionalityReduction'
dimensionality_reduction.delete(
  UserSession,
  dimensionality_reduction,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
dimensionality_reduction.list(
  UserSession,
  experiment_id,
  analysis_type,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
dimensionality_reduction.new(
  UserSession,
  experiment_id,
  analysis_name,
  analysis_type,
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,DimensionalityReduction'
dimensionality_reduction.rename(
  UserSession,
  dimensionality_reduction,
  analysis_name,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,DimensionalityReduction'
dimensionality_reduction.run(
  UserSession,
  dimensionality_reduction,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
dimensionality_reduction.show(
  UserSession,
  experiment_id,
  analysis_id,
  analysis_type,
  timeout = UserSession@short_timeout
)
```

```

)

## S4 method for signature 'UserSession,DimensionalityReduction'
dimensionality_reduction.status(
  UserSession,
  dimensionality_reduction,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,DimensionalityReduction'
dimensionality_reduction.update(
  UserSession,
  dimensionality_reduction,
  timeout = UserSession@long_timeout
)

```

Arguments

UserSession	Cytobank UserSession object
dimensionality_reduction	Cytobank DimensionalityReduction object
output	character representing the output format [optional] - <i>dimensionality_reduction.list</i> , <i>dimensionality_reduction.run</i> , <i>dimensionality_reduction.status</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds [optional]
experiment_id	integer representing an experiment ID
analysis_type	character representing the Dimensionality Reduction type (tSNE-CUDA, opt-SNE, UMAP, or viSNE)
analysis_name	character the name of the Dimensionality Reduction analysis
analysis_id	integer representing the Dimensionality Reduction analysis ID

Details

`dimensionality_reduction.copy_settings` Copy DimensionalityReduction advanced analysis settings from an experiment and returns a DimensionalityReduction object.

`dimensionality_reduction.delete` Delete a DimensionalityReduction advanced analysis from an experiment.

`dimensionality_reduction.list` List all DimensionalityReduction advanced analyses from an experiment. Outputs a dataframe [default] or list with all fields present.
- *Optional output parameter, specify one of the following: ("default", "raw")*

`dimensionality_reduction.new` Create a new DimensionalityReduction advanced analysis from an experiment and returns a DimensionalityReduction object.

`dimensionality_reduction.rename` Rename a DimensionalityReduction advanced analysis from an experiment and returns the new name.

`dimensionality_reduction.run` Run a DimensionalityReduction advanced analysis from an experiment.

`dimensionality_reduction.show` Show DimensionalityReduction advanced analysis details from an experiment and returns a DimensionalityReduction object.

`dimensionality_reduction.status` Show the status of a DimensionalityReduction advanced analysis from an experiment.

`dimensionality_reduction.update` Update a DimensionalityReduction advanced analysis from an experiment and returns the new DimensionalityReduction object.

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

# cyto_dimensionality_reduction refers to a DimensionalityReduction object that is created from
DimensionalityReduction endpoints
# examples: dimensionality_reduction.new, dimensionality_reduction.show (see details section for
more)

## End(Not run)
## Not run: dimensionality_reduction.copy_settings(cyto_session,
  dimensionality_reduction=cyto_dimensionality_reduction)

## End(Not run)
## Not run: dimensionality_reduction.delete(cyto_session,
  dimensionality_reduction=cyto_dimensionality_reduction)

## End(Not run)
## Not run: # Dataframe of all DimensionalityReduction advanced analyses with all fields present
dimensionality_reduction.list(cyto_session, 22, "visNE")

# Raw list of all DimensionalityReduction advanced analyses with all fields present
dimensionality_reduction.list(cyto_session, 22, "visNE", output="raw")

## End(Not run)
## Not run: dimensionality_reduction.new(cyto_session, 22,
  analysis_name="My new DimensionalityReduction analysis", "UMAP")

## End(Not run)
## Not run: dimensionality_reduction.rename(cyto_session,
  dimensionality_reduction=cyto_dimensionality_reduction,
  analysis_name="My updated DimensionalityReduction name")

## End(Not run)
## Not run: dimensionality_reduction.run(cyto_session,
  dimensionality_reduction=cyto_dimensionality_reduction)

## End(Not run)
## Not run: dimensionality_reduction.show(cyto_session, 22, analysis_id=2, "opt-SNE")
```

```
## Not run: dimensionality_reduction.status(cyto_session,
dimensionality_reduction=cyto_dimensionality_reduction)

## End(Not run)
## Not run: dimensionality_reduction.update(cyto_session,
dimensionality_reduction=cyto_dimensionality_reduction)

## End(Not run)
```

drop

DROP File Endpoints

Description

Upload DROP file(s) into Cytobank. A DROP file consists of any CSV, TSV, TXT, or FCS file. If the DROP file is of the type CSV, TSV, or TXT, the file will be converted to an FCS file to be used within Cytobank. [Learn more about DROP.](#)

Usage

```
## S4 method for signature 'UserSession'
drop.upload(
  UserSession,
  experiment_id,
  file_path,
  data_matrix_start_row = 2,
  data_matrix_start_column = 1,
  skipped_columns = c(),
  output = "default",
  timeout = UserSession@long_timeout
)
```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
file_path	character representing a file path
data_matrix_start_row	integer representing the start row of the DROP file(s)
data_matrix_start_column	integer representing the start column of the DROP file(s)
skipped_columns	integer vector representing the channels to skip within the DROP file(s)
output	character representing the output format [optional] - <i>drop.upload</i> : ("default", "raw") - <i>dataframe</i> : <i>converts the file internal compensation matrix output to a dataframe</i>
timeout	integer representing the request timeout time in seconds [optional]

Details

drop.upload Upload a DROP file (CSV, TSV, TXT, FCS) to an experiment. - *Optional output parameter, specify one of the following: ("default", "raw")*

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: drop.upload(cyto_session, 22, file_path="/path/to/my_drop_file.type",
  data_matrix_start_row=2, data_matrix_start_column=1, skipped_columns=c(4,8))

## End(Not run)
```

 experiments

Experiment Endpoints

Description

Interact with experiment endpoints. An Experiment is a container for data and analyses in Cytobank. If data are on Cytobank, they must be within an Experiment. Configurations such as [gates](#), [compensations](#), [scales](#), Sample Tags, and illustrations are also linked to an individual Experiment. Within the Cytobank interface, the [Experiment Summary Page](#) is a useful integration point for information about an Experiment.

Usage

```
## S4 method for signature 'UserSession'
experiments.clone_full(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
experiments.clone_selective(
  UserSession,
  experiment_id,
  experiment_name,
  fcs_files = c(-1),
  primary_researcher = NA,
  principal_investigator = NA,
  clone_gates = FALSE,
```

```
clone_annotations = FALSE,
clone_attachments = FALSE,
clone_reagents = FALSE,
clone_compensations = FALSE,
clone_panels = FALSE,
clone_illustrations = FALSE,
clone_project = FALSE,
clone_user_access = FALSE,
allow_full_access_pi = FALSE,
output = "default",
timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
experiments.delete(
  UserSession,
  experiment_id,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
experiments.full_access_users_list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
experiments.full_access_users_add(
  UserSession,
  experiment_id,
  user_id = NA,
  user_email = NA,
  username = NA,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
experiments.full_access_users_remove(
  UserSession,
  experiment_id,
  user_id = NA,
  user_email = NA,
  username = NA,
  timeout = UserSession@short_timeout
)
```

```
## S4 method for signature 'UserSession'
experiments.list(
  UserSession,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
experiments.new(
  UserSession,
  experiment_name,
  purpose,
  comments = NA,
  primary_researcher = NA,
  principal_investigator = NA,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
experiments.show(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
experiments.trash(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
experiments.update(
  UserSession,
  experiment,
  output = "default",
  timeout = UserSession@short_timeout
)
```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
output	character representing the output format [optional]

- *experiments.clone_full*, *experiments.clone_selective*, *experiments.full_access_users_list*, *experiments.list*, *experiments.new*, *experiments.show*, *experiments.trash*, *experiments.update* : ("default", "raw")

timeout	integer representing the request timeout time in seconds [optional]
experiment_name	character representing an experiment name
fcs_files	vector/list of integers representing a list of FCS file IDs [optional]
primary_researcher	integer representing a primary researcher ID [optional]
principal_investigator	integer representing a principal investigator ID [optional]
clone_gates	boolean denoting cloning gates option [optional]
clone_annotations	boolean denoting cloning annotations option [optional]
clone_attachments	boolean denoting cloning attachments option [optional]
clone_reagents	boolean denoting cloning reagents option [optional]
clone_compensations	boolean denoting cloning compensations option [optional]
clone_panels	boolean denoting cloning panels option [optional]
clone_illustrations	boolean denoting cloning illustrations option [optional]
clone_project	boolean denoting cloning project option [optional]
clone_user_access	boolean denoting cloning user access option [optional]
allow_full_access_pi	boolean denoting to allow full access to PI option [optional]
user_id	integer representing a user's ID
user_email	character representing a user's email
username	character representing a username
purpose	character representing an experiment purpose
comments	character representing an experiment comment [optional]
experiment	dataframe representing an experiment

Details

`experiments.clone_full` Full clone an experiment. [Learn more about the full clone functionality.](#)

- *Optional output parameter, specify one of the following:* ("default", "raw")

`experiments.clone_selective` Selectively clone an experiment. [Learn more about the selective clone functionality](#)

- *Optional output parameter, specify one of the following:* ("default", "raw")

`experiments.delete` Permanently delete an experiment and all analyses (including SPADE, viSNE, etc.) permanently. This is not reversible.

experiments.list List all full access users from an experiment.
 - *Optional output parameter, specify one of the following: ("default", "raw")*

experiments.list Add a full access user to an experiment. A full access user can be added by a user ID, email, or username.

experiments.list Remove a full access user from an experiment. A full access user can be removed by a user ID, email, or username.

experiments.list List all inbox experiments. Outputs a dataframe [default] or raw list with all fields present.
 - *Optional output parameter, specify one of the following: ("default", "raw")*

experiments.new Create a new experiment.
 - *Optional output parameter, specify one of the following: ("default", "raw")*

experiments.show Show experiment details.
 - *Optional output parameter, specify one of the following: ("default", "raw")*

experiments.trash Trash an experiment. This is reversible and not to be confused with permanent deletion.

experiments.update Update an experiment. (all parameters are optional, except for experiment_id)
 - *Optional output parameter, specify one of the following: ("default", "raw")*

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: experiments.clone_full(cyto_session, 22)

## Not run: experiments.clone_selective(cyto_session, 22,
  experiment_name="My New Experiment Name", fcs_files=c(12, 13, 14, 15, 16))

## End(Not run)
## Not run: experiments.delete(cyto_session, 22)

## Not run: # Dataframe of all full access users
experiments.full_access_users_list(cyto_session, 22)

# List of all full access users
experiments.full_access_users_list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: # Add a user as a full access user by user's ID
experiments.full_access_users_add(cyto_session, 22, user_id=2)

# Add a user as a full access user by user's email
experiments.full_access_users_add(cyto_session, 22, user_email="sammy_cytometry@cytobank.org")

# Add a user as a full access user by user's username
experiments.full_access_users_add(cyto_session, 22, username="sammy_cytometry")
```

```

## End(Not run)
## Not run: # Remove a user as a full access user by user's ID
experiments.full_access_users_remove(cyto_session, 22, user_id=2)

# Remove a user as a full access user by user's email
experiments.full_access_users_remove(cyto_session, 22, user_email="sammy_cytometry@cytobank.org")

# Remove a user as a full access user by user's username
experiments.full_access_users_remove(cyto_session, 22, username="sammy_cytometry")

## End(Not run)
## Not run: # Dataframe of all inbox experiments with all fields present
experiments.list(cyto_session)

# Raw list of all inbox experiments with all fields present
experiments.list(cyto_session, output="raw")

## End(Not run)
## Not run: experiments.new(cyto_session, "My New Experiment Name", "My experiment purpose",
  "An optional comment")

## End(Not run)
## Not run: experiments.show(cyto_session, 22)

## Not run: experiments.trash(cyto_session, 22)

## Not run: experiments.update(cyto_session, experiment=cyto_experiment)

```

fcs_files

FCS File Endpoints

Description

Interact with FCS file endpoints.

Usage

```

## S4 method for signature 'UserSession'
fcs_files.download(
  UserSession,
  experiment_id,
  fcs_file_id,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'

```



```
fcs_files.download_zip(  
  UserSession,  
  experiment_id,  
  fcs_files,  
  directory = getwd(),  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession'  
fcs_files.file_internal_comp_show(  
  UserSession,  
  experiment_id,  
  fcs_file_id,  
  output = "default",  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession'  
fcs_files.list(  
  UserSession,  
  experiment_id,  
  output = "default",  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession'  
fcs_files.show(  
  UserSession,  
  experiment_id,  
  fcs_file_id,  
  output = "default",  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession'  
fcs_files.upload(  
  UserSession,  
  experiment_id,  
  file_path,  
  output = "default",  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession'  
fcs_files.upload_zip(  
  UserSession,  
  experiment_id,  
  file_path,
```

```

    output = "default",
    timeout = UserSession@long_timeout
  )

```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
fcs_file_id	integer representing an FCS file ID
directory	character representing a specific directory to which the file will be downloaded (optional ending directory slash), if left empty, the default will be the current working directory [optional]
timeout	integer representing the request timeout time in seconds [optional]
fcs_files	vector/list of integers representing a list of FCS file IDs
output	character representing the output format [optional] <i>- fcs_files.file_internal_comp_show : ("default", "dataframe", "raw")</i> <i>- fcs_files.list, fcs_files.show, fcs_files.upload, fcs_files.upload_zip : ("default", "raw")</i> <i>- dataframe: converts the file internal compensation matrix output to a dataframe</i>
file_path	character representing a file path

Details

`fcs_files.download` Download an FCS file from an experiment.

`fcs_files.download_zip` Download all or a select set of FCS files as a zip file from an experiment.

`fcs_files.file_internal_comp_show` Show FCS file internal compensation (aka spillover matrix, spill matrix, spill string) details from an experiment.

- *Optional output parameter, specify one of the following: ("default", "dataframe", "raw")*

`fcs_files.list` List all FCS files from an experiment. Outputs a dataframe [default] or raw full list with all fields present.

- *Optional output parameter, specify one of the following: ("default", "raw")*

`fcs_files.show` Show FCS file details from an experiment. - *Optional output parameter, specify one of the following: ("default", "raw")*

`fcs_files.upload` Upload an FCS file to an experiment. - *Optional output parameter, specify one of the following: ("default", "raw")*

`fcs_files.upload_zip` Upload a zip of FCS file(s) to an experiment. - *Optional output parameter, specify one of the following: ("default", "raw")*

Examples

```

## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

```

```
## End(Not run)
## Not run: # Download an FCS file to the current working directory
fcs_files.download(cyto_session, 22, fcs_file_id=2)

# Download an FCS file to a new directory
fcs_files.download(cyto_session, 22, fcs_file_id=2, directory="/my/new/download/directory/")

## End(Not run)
## Not run: # Download all files, to the current directory
fcs_files.download_zip(cyto_session, 22)

# Download specific files, to a new directory
fcs_files.download_zip(cyto_session, 22, fcs_files=c(22, 23, 24, 25),
  directory="/my/new/download/directory/")

## End(Not run)
## Not run: # List of a file internal compensation, containing a file internal compensation matrix
fcs_files.file_internal_comp_show(cyto_session, 22, fcs_file_id=2)

# Dataframe only of a file internal compensation
fcs_files.file_internal_comp_show(cyto_session, 22, fcs_file_id=2, output="dataframe")

# Raw list of a file internal compensation
fcs_files.file_internal_comp_show(cyto_session, 22, fcs_file_id=2, output="raw")

## End(Not run)
## Not run: # Dataframe of all FCS files with all fields present
fcs_files.list(cyto_session, 22)

# Raw list of all FCS files with all fields present
fcs_files.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: fcs_files.show(cyto_session, 22, fcs_file_id=2)

## Not run: fcs_files.upload(cyto_session, 22, file_path="/path/to/my_fcs_file.fcs")

## Not run: fcs_files.upload_zip(cyto_session, 22, file_path="/path/to/my_fcs_files.zip")
```

Description

Interact with FlowSOM advanced analyses using these endpoints.

Usage

```
## S4 method for signature 'UserSession,FlowSOM'
flowsom.copy_settings(
  UserSession,
  flowsom,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,FlowSOM'
flowsom.delete(UserSession, flowsom, timeout = UserSession@short_timeout)

## S4 method for signature 'UserSession,FlowSOM'
flowsom.download(
  UserSession,
  flowsom,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
flowsom.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
flowsom.new(
  UserSession,
  experiment_id,
  flowsom_name,
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,FlowSOM'
flowsom.rename(
  UserSession,
  flowsom,
  flowsom_name,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,FlowSOM'
flowsom.run(
  UserSession,
  flowsom,
```

```

    output = "default",
    timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
flowsom.show(
  UserSession,
  experiment_id,
  flowsom_id,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,FlowSOM'
flowsom.status(
  UserSession,
  flowsom,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,FlowSOM'
flowsom.update(UserSession, flowsom, timeout = UserSession@long_timeout)

```

Arguments

UserSession	Cytobank UserSession object
flowsom	Cytobank FlowSOM object
output	character representing the output format [optional] - <i>flowsom.list</i> , <i>flowsom.run</i> , <i>flowsom.status</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds [optional]
directory	character representing a specific directory to which the file will be downloaded (optional ending directory slash), if left empty, the default will be the current working directory [optional]
experiment_id	integer representing an experiment ID
flowsom_name	character representing a new FlowSOM name
flowsom_id	integer representing a FlowSOM ID

Details

`flowsom.copy_settings` Copy FlowSOM advanced analysis settings from an experiment and returns a FlowSOM object.

`flowsom.delete` Delete a FlowSOM advanced analysis from an experiment.

`flowsom.download` Download a FlowSOM analysis from an experiment.

`flowsom.list` List all FlowSOM advanced analyses from an experiment. Outputs a dataframe [default] or list with all fields present.

- *Optional output parameter, specify one of the following: ("default", "raw")*

`flowsom.new` Create a new FlowSOM advanced analysis from an experiment and returns a FlowSOM object.

`flowsom.rename` Rename a FlowSOM advanced analysis from an experiment and returns a FlowSOM object.

`flowsom.run` Run a FlowSOM advanced analysis from an experiment.

`flowsom.show` Show FlowSOM advanced analysis details from an experiment and returns a FlowSOM object.

`flowsom.status` Show the status of a FlowSOM advanced analysis from an experiment.

`flowsom.update` Update a FlowSOM advanced analysis from an experiment and returns the new FlowSOM object.

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

# cyto_flowsom refers to a FlowSOM object that is created from FlowSOM endpoints
# examples: flowsom.new, flowsom.show (see details section for more)

## End(Not run)
## Not run: flowsom.copy_settings(cyto_session, flowsom=cyto_flowsom)

## Not run: flowsom.delete(cyto_session, flowsom=cyto_flowsom)

## Not run: # Download a FlowSOM analysis to the current working directory
flowsom.download(cyto_session, flowsom)

# Download a FlowSOM analysis to a new directory
flowsom.download(cyto_session, flowsom, directory="/my/new/download/directory/")

## End(Not run)
## Not run: # Dataframe of all FlowSOM advanced analyses with all fields present
flowsom.list(cyto_session, 22)

# Raw list of all FlowSOM advanced analyses with all fields present
flowsom.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: flowsom.new(cyto_session, 22, flowsom_name="My new FlowSOM analysis")

## Not run: flowsom.rename(cyto_session, flowsom=cyto_flowsom, flowsom_name=
"My updated FlowSOM name")

## End(Not run)
## Not run: flowsom.run(cyto_session, flowsom=cyto_flowsom)

## Not run: flowsom.show(cyto_session, 22, flowsom_id=2)
```

```
## Not run: flowsom.status(cyto_session, flowsom=cyto_flowsom)
## Not run: flowsom.update(cyto_session, flowsom=cyto_flowsom)
```

FlowSOM-class

S4 FlowSOM Class

Description

A FlowSOM object that holds pertinent FlowSOM advanced analysis run information, [learn more about FlowSOM](#). This class should never be called explicitly. If a user would like to create a new Cytobank FlowSOM object, utilize the [flowsom.new](#) function, or any other [FlowSOM endpoints that return FlowSOM objects documented in the 'Details' section](#).

Value

A FlowSOM advanced analysis object

Slots

attachment_id numeric representing the FlowSOM attachment to the source experiment containing the FlowSOM results

author character representing the author of the FlowSOM analysis

auto_seed logical representing whether to set an auto seed value or not

canceled logical representing whether or not the FlowSOM analysis is canceled

channels_to_plot list representing short channel IDs corresponding to channels to output channel-colored MST plots, [learn more about FlowSOM PDF output](#)

clustering_method character representing the clustering method
- choose from the following : ("consensus" [default], "hierarchical", "kmeans")

cluster_size_type character representing the cluster size type, [learn more about FlowSOM PDF output](#)
- choose from the following : ("both", "fixed", "relative" [default])

completed logical representing whether or not the FlowSOM analysis is complete

created_experiment numeric representing the experiment that gets created from the FlowSOM analysis

desired_events_per_file numeric representing the number of desired events per file if event_sampling_method is set to equal, [learn more about FlowSOM event sampling methods](#)

desired_total_events numeric representing the total desired number of events to sample amongst all selected files if event_sampling_method is set to proportional, [learn more about FlowSOM event sampling methods](#)

event_sampling_method character representing the FlowSOM sampling method, [learn more about FlowSOM event sampling methods](#)
- choose from the following : ("all", "equal" [default], "proportional")

expected_clusters numeric representing the number of expected clusters, [learn more about choosing target number of clusters for FlowSOM](#)
 expected_metaclusters numeric representing the expected number of metaclusters [learn more about choosing target number of metaclusters for FlowSOM](#)
 external_som_analysis_info character representing FlowSOM analysis information
 external_som_analysis_id character representing the ID of a corresponding FlowSOM analysis ID if som_creation_method set to "import_existing"
 external_som_attachment_id character representing the ID of a corresponding completed FlowSOM analysis if som_creation_method is set to import_existing
 fcs_files list of integers or character representing a list of FCS file IDs
 final_result character representing whether or not the FlowSOM analysis is successful
 fixed_cluster_size integer representing fixed cluster size if cluster_size_type set to "fixed" or "both" [learn more about FlowSOM PDF output](#)
 flowsom_id numeric representing the FlowSOM analysis ID
 gate_set_names_to_label list of character representing populations to label in the population pie plots, [learn more about FlowSOM PDF output](#)
 iterations numeric representing the number of times FlowSOM processes the dataset using its step-wise optimization algorithm, [learn more about iterations in FlowSOM](#)
 max_relative_cluster_size numeric representing the max relative cluster size (only applicable if cluster_size_type set to "relative" or "both", [learn more about FlowSOM PDF output](#)
 normalize_scales logical representing whether or not to normalize scales
 num_events_to_actually_sample numeric representing the events actually sampled
 num_fcs_files numeric representing the number of FCS files
 output_file_type character representing the output file type
 - choose from the following : ("both", "pdf" [default], "png")
 population_id integer representing a population **gate set ID**
 random_seed numeric representing the seed value [learn more about setting the seed for FlowSOM](#)
 show_background_on_legend logical representing whether or not to show background on legend, [learn more about FlowSOM PDF output](#)
 show_background_on_channel_colored_msts logical representing whether or not to show background on channel colored MSTs, [learn more about FlowSOM PDF output](#)
 show_background_on_population_pies logical representing whether or not to show background on population pies, [learn more about FlowSOM PDF output](#)
 som_creation_method character representing the FlowSOM creation method, [learn more about SOM creation methods for FlowSOM](#)
 - choose from the following : ("create_new" [default], "import_existing")
 type character

gates

Gate Endpoints

Description

Interact with gate endpoints. In Cytobank there is a distinction between gates and populations. A gate is simply a shape drawn on a plot. A [population](#) is a set of gates and can have parents and children. [Learn more about gates and populations](#). Currently, gate and population information can only be read and not written to Cytobank via the JSON API. To write gates and populations to Cytobank via the API, the `gates.gatingML_upload` endpoint should be used.

Usage

```
## S4 method for signature 'UserSession'
gates.gatingML_download(
  UserSession,
  experiment_id,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
gates.gatingML_upload(
  UserSession,
  experiment_id,
  file_path,
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
gates.apply(UserSession, experiment_id, timeout = UserSession@long_timeout)

## S4 method for signature 'UserSession'
gates.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
gates.show(
  UserSession,
  experiment_id,
  gate_id,
  output = "default",
  timeout = UserSession@short_timeout
```

)

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
directory	character representing a specific directory to which the file will be downloaded (optional ending directory slash), if left empty, the default will be the current working directory [optional]
timeout	integer representing the request timeout time in seconds [optional]
file_path	character representing a file path
output	character representing the output format [optional] - <i>gates.list, gates.show</i> : ("default", "raw")
gate_id	integer representing a gate ID

Details

`gates.gatingML_download` Download the gatingML from an experiment. [Learn more about Gating-ML.](#)

`gates.gatingML_upload` Upload a gatingML to an experiment. [Learn more about Gating-ML.](#)

`gates.apply` Apply gates as Experiment Gates. Gates must be applied in order for Scratch Gates to be converted to Experiment gates. Experiment gates are used for generating statistics, illustrations, and advanced analyses. [Learn more about applying gates.](#)

`gates.list` List all gates from an experiment. Outputs a dataframe [default] or raw list with all fields present. Currently only the Scratch Gates from the gating interface are returned. These have a version of -1. This is to be contrasted with Experiment Gates, which will have a version number that is a positive integer equal to the number of times the version has been incremented in the gating interface. [Learn more about gate versioning in Cytobank.](#)

- *Optional output parameter, specify one of the following:* ("default", "raw")

`gates.show` Show gate details from an experiment.

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: gates.gatingML_download(cyto_session, 22, directory="/my/new/download/directory/")

## Not run: gates.gatingML_upload(cyto_session, 22, file_path="/path/to/my_gatingML.xml")

## Not run: gates.apply(cyto_session, 22)

## Not run: # Dataframe of all gates with all fields present
gates.list(cyto_session, 22)
```

```
# Raw list of all gates with all fields present
gates.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: gates.show(cyto_session, 22, gate_id=2)
```

helper_functions *Helper Functions*

Description

Various helper functions to utilize within the Cytobank API.

Usage

```
helper.filter_names_to_ids_from_df(ids_names_df, names_array = c("*"))

helper.channel_ids_from_long_names(
  panels_list,
  long_channel_names,
  fcs_files = c()
)
```

Arguments

ids_names_df	dataframe containing both IDs and their associated names
names_array	vector or list of character regular expressions to use
panels_list	list provided from the panels.list endpoint
long_channel_names	vector of character representing long channel names
fcs_files	vector of integers representing a list of FCS file IDs

Details

`helper.filter_names_to_ids_from_df` Compile a vector of IDs from an array of regular expressions.

`helper.channel_ids_from_long_names` Compile a vector of IDs based on long channel names for specific FCS files from an experiment. If no FCS files are provided, IDs will be retrieved based on unique short channel / long channel combinations across all FCS files.

Examples

```
## Not run: helper.filter_names_to_ids_from_df(id_and_names_dataframe,
names_list=c("CD.*", "Time", "pp38"))

## End(Not run)
## Not run: helper.channel_ids_from_long_names(panels.list(cyto_session, 22),
long_channel_names=c("long_channel1", "long_channel2"), fcs_files=c(1,2,3,4,5))

## End(Not run)
```

news

News

Description

Get news on CytobankAPI updates

Usage

CytobankAPI_news()

Details

CytobankAPI_news View a log of CytobankAPI updates and release notes.

optSNE-class

S4 opt-SNE Class

Description

A opt-SNE object that holds pertinent opt-SNE advanced analysis run information. This class should never be called explicitly. If a user would like to create a new Cytobank opt-SNE object, utilize the [dimensionality_reduction.new](#) function, or any other [opt-SNE endpoints that return opt-SNE objects documented in the 'Details' section](#).

Value

A Dimensionality Reduction advanced analysis object

Slots

perplexity numeric representing a rough guess for the number of close neighbors any given cellular event will have, [learn more about Dimensionality Reduction perplexity](#)
 auto_learning_rate logical representing whether or not to set auto learning rate
 clustering_channels list the channels selected for the Dimensionality Reduction analysis, this can be either a list of short channel IDs (integer) OR long channel names (character)
 desired_events_per_file numeric representing the number of desired events per file
 desired_total_events numeric representing the number of desired total events per file
 early_exaggeration numeric representing how tight natural clusters in the original space are in the embedded space and how much space will be between them
 event_sampling_method character representing the name of event sampling method will be used, [learn more about Event Sampling for Dimensionality Reduction analysis](#)
 fcsfile_ids list representing the fcs file ids
 gateset_id numeric representing the selected gate id
 learning_rate numeric representing the learning rate, [learn more about opt-SNE learning rate.](#)
 max_iterations numeric representing the maximum number of iterations to perform– typically opt-SNE will automatically stop before this number is reached
 normalize_scales logical representing whether or not to normalize scales
 random_seed numeric representing the seed, Dimensionality Reduction picks a random seed each run, but if users want reproducible data, setting the same seed will allow them to do this

 panels

Panel Endpoints

Description

Interact with panel endpoints. A collection of channels, the markers being studied on them, and the FCS files this applies to form a panel. [Learn more about panels in Cytobank.](#)

Usage

```

## S4 method for signature 'UserSession'
panels.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
panels.show(
  UserSession,
  experiment_id,

```

```

    panel_id,
    output = "default",
    timeout = UserSession@short_timeout
  )

```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
output	character representing the output format [optional] - <i>panels.list, panels.show</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds [optional]
panel_id	integer representing a panel ID

Details

`panels.list` List all panels from an experiment. Outputs a formatted list [default] or raw list with all fields present.

- *Optional output parameter, specify one of the following:* ("default", "raw")

`panels.show` Show panel details from an experiment. Outputs a full list with all fields present, or an IDs/names list (See [attachments](#) examples section for IDs/names list example).

- *Optional output parameter, specify one of the following:* ("default", "raw")

Examples

```

## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: # Full panel list with all fields present, with a dataframe of channels
panels.list(cyto_session, 22)

# Raw list of all panels with all fields present
panels.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: # Full panel info with all fields present
panels.show(cyto_session, 22, panel_id=2)

## End(Not run)

```

populations *Population Endpoints*

Description

Interact with population (aka gate sets) endpoints. A population is a set of [gates](#) and can have parents and children. [Learn more about gates and populations.](#)

Usage

```
## S4 method for signature 'UserSession'
populations.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
populations.show(
  UserSession,
  experiment_id,
  population_id,
  output = "default",
  timeout = UserSession@short_timeout
)
```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
output	character representing the output format [optional] - <i>populations.list, populations.show</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds
population_id	integer representing a population ID

Details

`populations.list` List all populations from an experiment. Outputs a dataframe [default] or raw list with all fields present.

- *Optional output parameter, specify one of the following:* ("default", "raw")

`populations.show` Show population details from an experiment. - *Optional output parameter, specify one of the following:* ("default", "raw")

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: # Dataframe of all populations with all fields present
populations.list(cyto_session, 22)

# Raw list of all populations with all fields present
populations.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: populations.show(cyto_session, 22, population_id=2)
```

sample_tags

Sample Tag Endpoints

Description

Interact with sample tag endpoints. Download and upload sample tags to save time during the annotation process. [Learn more about sample tags here.](#)

Usage

```
## S4 method for signature 'UserSession'
sample_tags.download(
  UserSession,
  experiment_id,
  directory = getwd(),
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
sample_tags.upload(
  UserSession,
  experiment_id,
  file_path,
  timeout = UserSession@long_timeout
)
```

Arguments

UserSession Cytobank UserSession object
experiment_id integer representing an [experiment ID](#)

directory	character representing a specific directory to which the file will be downloaded (optional ending directory slash), if left empty, the default will be the current working directory [optional]
timeout	integer representing the request timeout time in seconds
file_path	character representing a file path

Details

`sample_tags.download` Download the sample tags from an experiment.

`sample_tags.upload` Upload sample tag annotation data TSV to an experiment.

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: # Download the experiment sample tags TSV to the current working directory
sample_tags.download(cyto_session, 22)

# Download the experiment sample tags TSV to a new directory
sample_tags.download(cyto_session, 22, directory="/my/new/download/directory/")

## End(Not run)
## Not run: sample_tags.upload(cyto_session, 22, file_path="/path/to/my_annotations.tsv")
```

scales *Scale Endpoints*

Description

Interact with scale endpoints. Data are rarely presented exactly as they were acquired on the instrument. [Learn more about data scaling.](#)

Usage

```
## S4 method for signature 'UserSession'
scales.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
```

```
scales.show(
  UserSession,
  experiment_id,
  scale_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
scales.update(
  UserSession,
  scale,
  output = "default",
  timeout = UserSession@short_timeout
)
```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
output	character representing the output format [optional] - <i>scales.list</i> , <i>scales.show</i> , <i>scales.update</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds
scale_id	integer representing a scale ID
scale	dataframe representing a scale

Details

`scales.list` List all scales from an experiment. Outputs a dataframe [default] or raw list with all fields present.

- *Optional output parameter, specify one of the following:* ("default", "raw")

`scales.show` Show scale details from an experiment. - *Optional output parameter, specify one of the following:* ("default", "raw")

`scales.update` Update a single scale from an experiment. (all parameters are optional, except for `experiment_id` and `scale_id`)

- *Scale Types* – 1: Linear, 2: Log, 4: Arcsinh

- *Optional output parameter, specify one of the following:* ("default", "raw")

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: # Dataframe of all scales with all fields present
scales.list(cyto_session, 22)
```

```

# Raw list of all scales with all fields present
scales.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: scales.show(cyto_session, 22, scale_id=2)

## Not run: # Update any number of parameters (scale_type, cofactor, minimum, maximum)
# Scale Types -- 1: Linear, 2: Log, 4: Arcsinh
scales.update(cyto_session, scale=cyto_scale)

## End(Not run)

```

spade

SPADE Endpoints

Description

Interact with SPADE advanced analyses using these endpoints.

Usage

```

## S4 method for signature 'UserSession,SPADE'
spade.bubbles_export(
  UserSession,
  spade,
  bubbles,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,SPADE'
spade.bubbles_set(
  UserSession,
  spade,
  bubbles,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,SPADE'
spade.bubbles_show(
  UserSession,
  spade,
  output = "default",
  timeout = UserSession@short_timeout
)

```

```
## S4 method for signature 'UserSession,SPADE'  
spade.copy_results(  
  UserSession,  
  spade,  
  output = "default",  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession,SPADE'  
spade.copy_settings(  
  UserSession,  
  spade,  
  output = "default",  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession,SPADE'  
spade.delete(UserSession, spade, timeout = UserSession@short_timeout)  
  
## S4 method for signature 'UserSession,SPADE'  
spade.download_all(  
  UserSession,  
  spade,  
  directory = getwd(),  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession,SPADE'  
spade.download_clusters_table(  
  UserSession,  
  spade,  
  directory = getwd(),  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession,SPADE'  
spade.download_global_boundaries_table(  
  UserSession,  
  spade,  
  directory = getwd(),  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession,SPADE'  
spade.download_gml(  
  UserSession,  
  spade,  
  directory = getwd(),
```

```
    timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,SPADE'
spade.download_layout_table(
  UserSession,
  spade,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,SPADE'
spade.download_statistics_tables(
  UserSession,
  spade,
  directory = getwd(),
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
spade.list(
  UserSession,
  experiment_id,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
spade.new(
  UserSession,
  experiment_id,
  spade_name,
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession,SPADE'
spade.rename(
  UserSession,
  spade,
  spade_name,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,SPADE'
spade.run(
  UserSession,
  spade,
  output = "default",
```

```

    timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
spade.show(
  UserSession,
  experiment_id,
  spade_id,
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession, SPADE'
spade.status(
  UserSession,
  spade,
  output = "default",
  timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession, SPADE'
spade.update(UserSession, spade, timeout = UserSession@long_timeout)

```

Arguments

UserSession	Cytobank UserSession object
spade	Cytobank SPADE object
bubbles	vector/list of characters representing bubbles within a SPADE analysis, learn more about SPADE bubbles
output	character representing the output format [optional] - <i>spade.list</i> , <i>spade.run</i> , <i>spade.status</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds [optional]
directory	character representing a specific directory (optional ending directory slash), default will be current working directory [optional]
experiment_id	integer representing an experiment ID
spade_name	character representing a new SPADE name
spade_id	integer representing a SPADE ID

Details

`spade.bubbles_export` Export SPADE advanced analysis bubbles from an experiment to a new experiment.

`spade.bubbles_set` Set SPADE advanced analysis bubbles from an experiment.

`spade.bubbles_show` Show SPADE advanced analysis bubbles from an experiment.

`spade.copy_results` Copy SPADE advanced analysis results from an experiment to a new experiment.

`spade.copy_settings` Copy SPADE advanced analysis settings from an experiment.
`spade.delete` Delete a SPADE advanced analysis from an experiment.
`spade.download_all` Download a SPADE advanced analysis with all data included from an experiment.
`spade.download_clusters_table` Download a SPADE advanced analysis global clusters table from an experiment.
`spade.download_global_boundaries_table` Download a SPADE advanced analysis global boundaries table from an experiment.
`spade.download_gml` Download a SPADE advanced analysis GML from an experiment.
`spade.download_layout_table` Download a SPADE advanced analysis layout table from an experiment.
`spade.download_statistics_tables` Download a SPADE advanced analysis statistics table from an experiment.
`spade.list` List all SPADE advanced analyses from an experiment. Outputs a dataframe [default] or list with all fields present.
- Optional output parameter, specify one of the following: ("default", "raw")
`spade.new` Create a new SPADE advanced analysis from an experiment and returns a SPADE object.
`spade.rename` Rename a SPADE advanced analysis from an experiment and returns a SPADE object.
`spade.run` Run a SPADE advanced analysis from an experiment.
`spade.show` Show SPADE advanced analysis details from an experiment and returns a SPADE object.
`spade.status` Show the status of a SPADE advanced analysis from an experiment.
`spade.update` Update a SPADE advanced analysis from an experiment and returns the new SPADE object.

Examples

```

## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

# cyto_spade refers to a SPADE object that is created from SPADE endpoints
# examples: spade.new, spade.show (see details section for more)

## End(Not run)
## Not run: spade.bubbles_export(cyto_session, spade=cyto_spade, bubbles=c("bubble1", "bubble2"))

## Not run: named_bubble_list_of_node_vectors <- list("bubble_1"=c(1,2,4), "bubble_2"=8, "bubble_4"=c(10,12))
spade.bubbles_set(cyto_session, spade=cyto_spade, bubbles=named_bubble_list_of_node_vectors)

## End(Not run)
## Not run: spade.bubbles_show(cyto_session, spade=cyto_spade)

```

```

## Not run: spade.copy_results(cyto_session, spade=cyto_spade)

## Not run: spade.copy_settings(cyto_session, spade=cyto_spade)

## Not run: spade.delete(cyto_session, spade=cyto_spade)

## Not run: spade.download_all(cyto_session, spade=cyto_spade,
directory="/my/new/download/directory/")

## End(Not run)
## Not run: spade.download_clusters_table(cyto_session, spade=cyto_spade,
directory="/my/new/download/directory/")

## End(Not run)
## Not run: spade.download_global_boundaries_table(cyto_session,
spade=cyto_spade, directory="/my/new/download/directory/")

## End(Not run)
## Not run: spade.download_gml(cyto_session, spade=cyto_spade,
directory="/my/new/download/directory/")

## End(Not run)
## Not run: spade.download_layout_table(cyto_session, spade=cyto_spade,
directory="/my/new/download/directory/")

## End(Not run)
## Not run: spade.download_statistics_tables(cyto_session, spade=cyto_spade,
directory="/my/new/download/directory/")

## End(Not run)
## Not run: # Dataframe of all SPADE advanced analyses with all fields present
spade.list(cyto_session, 22)

# Raw list of all SPADE advanced analyses with all fields present
spade.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: spade.new(cyto_session, 22, spade_name="My new SPADE analysis")

## Not run: spade.rename(cyto_session, spade=cyto_spade, spade_name="My updated SPADE name")

## Not run: spade.run(cyto_session, spade=cyto_spade)

## Not run: spade.show(cyto_session, 22, spade_id=2)

## Not run: spade.status(cyto_session, spade=cyto_spade)

## Not run: spade.update(cyto_session, spade=cyto_spade)

```


Description

A SPADE object that holds pertinent SPADE advanced analysis run information. This class should never be called explicitly. If a user would like to create a new Cytobank SPADE object, utilize the [spade.new](#) function, or any other [SPADE endpoints that return SPADE objects documented in the 'Details' section](#).

Value

A SPADE advanced analysis object

Slots

`created_experiment` numeric representing the experiment that gets created from the SPADE analysis

`down_sampled_events_target` numeric representing the percent OR absolute number (depends on 'down_sampled_events_type' slot) for downsampling occurring within the SPADE analysis, [learn more about SPADE density-dependent downsampling](#)

`down_sampled_events_type` character representing the downsampling type for `down_sampled_events_target`, [learn more about SPADE density-dependent downsampling types - choose one of the following](#): ("percent" [default], "absolute_number")

`fold_change_groups` dataframe representing the fold change groups within a SPADE analysis, [learn more about SPADE fold change groups](#)

`population_id` numeric representing the population to run the SPADE analysis on, [learn more about choosing a population for SPADE](#)

`spade_id` numeric representing the SPADE analysis ID

`target_number_nodes` numeric representing how many population nodes SPADE will seek out within the given data, [learn more about target number of nodes for SPADE](#)

 statistics

Statistic Endpoints

Description

Interact with statistic endpoints. Gather data about event counts and general channel statistics. Create dataframes of statistics to help with visualization and downstream analysis.

Usage

```
## S4 method for signature 'UserSession'
statistics.event_counts(
  UserSession,
  experiment_id,
  gate_version = -1,
  compensation_id,
  fcs_files,
```

```

populations = c(),
output = "dataframe",
timeout = UserSession@long_timeout
)

## S4 method for signature 'UserSession'
statistics.general(
  UserSession,
  experiment_id,
  gate_version = -1,
  compensation_id,
  fcs_files,
  channels,
  populations = c(),
  output = "dataframe_row",
  timeout = UserSession@long_timeout
)

```

Arguments

UserSession	Cytobank UserSession object
experiment_id	integer representing an experiment ID
gate_version	integer representing an experiment gate version, an integer of -1 corresponds to the state of gates and populations in the gating interface. Faster performance can be achieved by using the maximum gate version from the experiment (learn more about gate versions). Maximum gate version can be seen as the gateVersion attribute returned from a call to the Show Experiment Details endpoint [optional]
compensation_id	integer representing a compensation ID (use -2 for file-internal compensation, -1 for uncompensated)
fcs_files	vector/list of integers representing a list of FCS file IDs
populations	vector/list of integers representing a list of population IDs to calculate statistics for. This is the gateSetId attribute of a population object. Another term for a population is a "gate set". If not specified, all population statistics will be fetched [optional]
output	character representing the output format [optional] - <i>statistics.event_counts</i> : ("default" [default], "dataframe") - <i>statistics.general</i> : ("default", "dataframe_col", "dataframe_row") - dataframe: <i>converts the output to a dataframe for the event count statistics</i> - dataframe_col: <i>for statistics data on multiple channels, proliferate channel statistics as columns</i> - dataframe_row: <i>for statistics data on multiple channels, proliferate channel statistics as rows</i>
timeout	integer representing the request timeout time in seconds
channels	vector/list of integers or character representing a list of channel IDs (integers) or long channel names (character)

Details

`statistics.event_counts` Get event count statistics from an experiment. In the absence of channel information, only event count data are returned. If only event count data are needed, this approach can be faster than retrieving all statistics by avoiding unnecessary computation.

- *Optional output parameter, specify one of the following:* ("full", "dataframe" [default])
- *dataframe:* converts the output to a dataframe for the event count statistics

`statistics.general` Get a batch of common statistics for specific channels on populations from an experiment.

- *Optional output parameter, specify one of the following:* ("full", "dataframe_col", "dataframe_row" [default])
- *dataframe_col:* for statistics data on multiple channels, proliferate channel statistics as columns
- *dataframe_row:* for statistics data on multiple channels, proliferate channel statistics as rows

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: statistics.event_counts(cyto_session, 22, compensation_id=-2,
  fcs_files=c(12, 13, 14), channels=c(53, 54, 55), populations=c(32, 33, 34))

## End(Not run)
## Not run: # Full list with all fields present
statistics.general(cyto_session, 22, compensation_id=-2,
  fcs_files=c(12, 13, 14), channels=c(53, 54, 55), populations=c(32, 33, 34))

# Statistics list transformed into a dataframe, proliferating channel statistics by column
statistics.general(cyto_session, 22, compensation_id=-2,
  fcs_files=c(12, 13, 14), channels=c(53, 54, 55), populations=c(32, 33), output="dataframe_col")

# Statistics list transformed into a dataframe, proliferating channel statistics by row
statistics.general(cyto_session, 22, compensation_id=-2,
  fcs_files=c(12, 13, 14), channels=c(53, 54, 55), populations=c(32, 33), output="dataframe_row")

# Statistics list transformed into a dataframe, using helper functions (names_to_ids)
# Get FCS files that match 'pbmc' in their filename
fcs_files <- fcs_files.list(cyto_session, 22)
fcs_files <- fcs_files[,c("id", "filename")]
fcs_files <- unlist(fcs_files$id[grep("pbmc", fcs_files$filename)])

# Get channels that match 'pp' or 'pStat' as their longName
channels <- panels.list(cyto_session, 22)$`Panel 1`$channels
channels <- channels[,c("normalizedShortNameId", "shortName", "longName")]
channels <- channels$normalizedShortNameId[grep("pp.*|pStat.*", channels$longName)]

# Get populations that match 'CD' as their population name
populations <- populations.list(cyto_session, 22)
```

```

populations <- populations[,c("gateSetId", "name")]
populations <- populations$id[grep("CD.*", populations$name)]

statistics.general(cyto_session, 22, compensation_id=-2,
  fcs_files=fcs_files, channels=channels, populations=populations, output="dataframe_row")

## End(Not run)

```

tSNE-class

S4 tSNE Class

Description

A tSNE object that holds pertinent tSNE advanced analysis run information. This class should never be called explicitly. If a user would like to create a new Cytobank Dimensionality Reduction object, utilize the [dimensionality_reduction.new](#) function, or any other [Dimensionality Reduction endpoints that return Dimensionality Reduction objects documented in the 'Details' section](#).

Value

A Dimensionality Reduction advanced analysis object

Slots

`iterations` numeric representing the number of times Dimensionality Reduction processes the dataset using its step-wise optimization algorithm, [learn more about how iterations affect Dimensionality Reduction results](#)

`perplexity` numeric representing a rough guess for the number of close neighbors any given cellular event will have, [learn more about Dimensionality Reduction perplexity](#)

`auto_iterations` logical representing whether or not to set auto iterations

`auto_learning_rate` logical representing whether or not to set auto learning rate

`clustering_channels` list the channels selected for the Dimensionality Reduction analysis, this can be either a list of short channel IDs (integer) OR long channel names (character)

`desired_events_per_file` numeric representing the number of desired events per file

`desired_total_events` numeric representing the number of desired total events per file

`early_exaggeration` numeric representing how tight natural clusters in the original space are in the embedded space and how much space will be between them

`event_sampling_method` character representing the name of event sampling method will be used, [learn more about Event Sampling for Dimensionality Reduction analysis](#)

`fcsfile_ids` list representing the fcs file ids

`gateset_id` numeric representing the selected gate id

`learning_rate` numeric representing the learning rate

`normalize_scales` logical representing whether or not to normalize scales

 UMAP-class

S4 UMAP Class

Description

A UMAP object that holds pertinent UMAP advanced analysis run information. This class should never be called explicitly. If a user would like to create a new Cytobank UMAP object, utilize the [dimensionality_reduction.new](#) function, or any other [UMAP endpoints that return UMAP objects documented in the 'Details' section](#).

Value

A UMAP advanced analysis object

Slots

`clustering_channels` list the channels selected for the Dimensionality Reduction analysis, this can be either a list of short channel IDs (integer) OR long channel names (character)

`collapse_outliers` logical Dimension values that are significant outliers (z-score > 3) will be collapsed to be equal to the min or max value. Try this if you observe that most of the data appears squished within small region

`desired_events_per_file` numeric representing the number of desired events per file

`desired_total_events` numeric representing the number of desired total events per file

`event_sampling_method` character representing the name of event sampling method will be used, [learn more about Event Sampling for Dimensionality Reduction analysis](#)

`fcsfile_ids` list representing the fcs file ids

`gateset_id` numeric representing the selected gate id

`min_distance` numeric the effective minimum distance between embedded points, [learn more about minimum distance for UMAP analysis](#)

`num_neighbors` numeric the size of local neighborhood (in terms of number of neighboring sample points) used for manifold approximation, [learn more about number of neighbors for UMAP analysis](#)

`normalize_scales` logical representing whether or not to normalize scales

 users

User Endpoints

Description

Interact with user endpoints. One should never analyze alone...

Usage

```
## S4 method for signature 'UserSession'
users.list(
  UserSession,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession'
users.show(
  UserSession,
  user_id,
  output = "default",
  timeout = UserSession@short_timeout
)
```

Arguments

UserSession	Cytobank UserSession object
output	character representing the output format [optional] - <i>users.list, users.show</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds [optional]
user_id	integer representing a user ID

Details

`users.list` List all users from an experiment. Outputs a dataframe [default] or raw list with all fields present.
- *Optional output parameter, specify one of the following*: ("default", "raw")

`users.show` Show user details from an experiment. - *Optional output parameter, specify one of the following*: ("default", "raw")

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

## End(Not run)
## Not run: # Dataframe of all users with all fields present
users.list(cyto_session)

# Raw list of all users with all fields present
users.list(cyto_session, output="raw")

## End(Not run)
## Not run: users.show(cyto_session, user_id=2)
```

UserSession-class *S4 Cytobank UserSession Class*

Description

A Cytobank UserSession object that holds pertinent user information, used to make calls to various Cytobank endpoints. This class should never be called explicitly. If a user would like to create a new Cytobank UserSession object, utilize the [authenticate](#) function.

Value

A Cytobank UserSession object

Slots

auth_token character representing Cytobank user's authentication token (expires in 8 hours)
 long_timeout numeric representing long request timeout times
 short_timeout numeric representing short request timeout times
 site character representing Cytobank user's site

Examples

```
cytobank_user <- new("UserSession", auth_token="my_auth_token", site="premium")
```

visne *visNE Endpoints*

Description

Interact with visNE advanced analyses using these endpoints.

Usage

```
## S4 method for signature 'UserSession,visNE'
visne.copy_settings(
  UserSession,
  visne,
  output = "default",
  timeout = UserSession@short_timeout
)

## S4 method for signature 'UserSession,visNE'
visne.delete(UserSession, visne, timeout = UserSession@short_timeout)

## S4 method for signature 'UserSession'
```

```
visne.list(  
  UserSession,  
  experiment_id,  
  output = "default",  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession'  
visne.new(  
  UserSession,  
  experiment_id,  
  visne_name,  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession,visNE'  
visne.rename(  
  UserSession,  
  visne,  
  visne_name,  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession,visNE'  
visne.run(  
  UserSession,  
  visne,  
  output = "default",  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession'  
visne.show(  
  UserSession,  
  experiment_id,  
  visne_id,  
  timeout = UserSession@short_timeout  
)  
  
## S4 method for signature 'UserSession,visNE'  
visne.status(  
  UserSession,  
  visne,  
  output = "default",  
  timeout = UserSession@long_timeout  
)  
  
## S4 method for signature 'UserSession,visNE'
```



```
visne.update(UserSession, visne, timeout = UserSession@long_timeout)

visne.helper.set_populations(visne, population_id = NA, fcs_files = NA)
```

Arguments

UserSession	Cytobank UserSession object
visne	Cytobank viSNE object
output	character representing the output format [optional] - <i>visne.list</i> , <i>visne.run</i> , <i>visne.status</i> : ("default", "raw")
timeout	integer representing the request timeout time in seconds [optional]
experiment_id	integer representing an experiment ID
visne_name	character representing a new viSNE name
visne_id	integer representing a viSNE ID
population_id	integer representing a population gate set ID
fcs_files	vector/list of integers representing a list of FCS file IDs

Details

`visne.copy_settings` Copy viSNE advanced analysis settings from an experiment and returns a viSNE object.

`visne.delete` Delete a viSNE advanced analysis from an experiment.

`visne.list` List all viSNE advanced analyses from an experiment. Outputs a dataframe [default] or list with all fields present.

- *Optional output parameter, specify one of the following: ("default", "raw")*

`visne.new` Create a new viSNE advanced analysis from an experiment and returns a viSNE object.

`visne.rename` Rename a viSNE advanced analysis from an experiment and returns a viSNE object.

`visne.run` Run a viSNE advanced analysis from an experiment.

`visne.show` Show viSNE advanced analysis details from an experiment and returns a viSNE object.

`visne.status` Show the status of a viSNE advanced analysis from an experiment.

`visne.update` Update a viSNE advanced analysis from an experiment and returns the new viSNE object.

`visne.helper.set_populations` Set viSNE advanced analysis populations to be selected from an experiment and returns the new viSNE object with the new population selections. The population provided will be overwritten by the newly selected FCS files provided.

Examples

```
## Not run: # Authenticate via username/password
cyto_session <- authenticate(site="premium", username="cyril_cytometry", password="cytobank_rocks!")
# Authenticate via auth_token
cyto_session <- authenticate(site="premium", auth_token="my_secret_auth_token")

# cyto_visne refers to a viSNE object that is created from visNE endpoints
```

```

# examples: visne.new, visne.show (see details section for more)

## End(Not run)
## Not run: visne.copy_settings(cyto_session, visne=cyto_visne)

## Not run: visne.delete(cyto_session, visne=cyto_visne)

## Not run: # Dataframe of all viSNE advanced analyses with all fields present
visne.list(cyto_session, 22)

# Raw list of all viSNE advanced analyses with all fields present
visne.list(cyto_session, 22, output="raw")

## End(Not run)
## Not run: visne.new(cyto_session, 22, visne_name="My new viSNE analysis")

## Not run: visne.rename(cyto_session, visne=cyto_visne, visne_name="My updated viSNE name")

## Not run: visne.run(cyto_session, visne=cyto_visne)

## Not run: visne.show(cyto_session, 22, visne_id=2)

## Not run: visne.status(cyto_session, visne=cyto_visne)

## Not run: visne.update(cyto_session, visne=cyto_visne)

## Not run: visne.helper.set_populations(visne=cyto_visne, population_id=1, fcs_files=c(1,2,3))

```

viSNE-class

S4 viSNE Class

Description

A viSNE object that holds pertinent viSNE analysis run information. This class should never be called explicitly. If a user would like to create a new Cytobank Dimensionality Reduction object, utilize the [dimensionality_reduction.new](#) function, or any other [Dimensionality Reduction endpoints that return Dimensionality Reduction objects documented in the 'Details' section](#).

Value

A Dimensionality Reduction advanced analysis object

Slots

`iterations` numeric representing the number of times Dimensionality Reduction processes the dataset using its step-wise optimization algorithm, [learn more about how iterations affect Dimensionality Reduction results](#)

`perplexity` numeric representing a rough guess for the number of close neighbors any given cellular event will have, [learn more about Dimensionality Reduction perplexity](#)

`channels` list the channels selected for the Dimensionality Reduction analysis, this can be either a list of short channel IDs (integer) OR long channel names (character)

`compensation_id` the compensation ID selected for the Dimensionality Reduction analysis

`population_selections` dataframe representing which population(s) data will be sourced, [learn more about selecting populations for Dimensionality Reduction](#)

`sampling_total_count` numeric representing the total number of events to sample for the Dimensionality Reduction analysis

`sampling_target_type` character representing the event sampling type
- *choose one of the following* : ("proportional", "equal")

`seed` character representing the seed, Dimensionality Reduction picks a random seed each run, but if users want reproducible data, setting the same seed will allow them to do this

`theta` numeric representing the balance of speed and accuracy in the Dimensionality Reduction run compared to the original tSNE algorithm, [learn more about Dimensionality Reduction theta](#)

`visne_id` numeric representing the Dimensionality Reduction analysis ID

Index

AdvancedAnalysis-class, [2](#)
attachments, [3](#), [38](#)
authenticate, [55](#)
authenticate (authentication), [6](#)
authentication, [6](#)

citrus, [7](#)
CITRUS endpoints that return CITRUS objects documented in the 'Details' section, [11](#)
CITRUS-class, [11](#)
citrus.new, [11](#)
compensation, [50](#)
compensations, [12](#), [19](#)
CytobankAPI_news (news), [36](#)

Dimensionality Reduction endpoints that return Dimensionality Reduction objects documented in the 'Details' section, [14](#), [52](#), [58](#)
dimensionality_reduction, [14](#)
dimensionality_reduction.new, [14](#), [36](#), [52](#), [53](#), [58](#)
DimensionalityReduction-class, [13](#)
drop, [18](#)

experiment, [4](#), [9](#), [12](#), [16](#), [18](#), [26](#), [29](#), [34](#), [38-40](#), [42](#), [46](#), [50](#), [57](#)
experiments, [19](#)

FCS file, [22](#), [50](#)
FCS files, [12](#)
fcs_files, [24](#)
fcs_files.list, [3](#), [14](#)
flowsom, [27](#)
FlowSOM endpoints that return FlowSOM objects documented in the 'Details' section, [31](#)
FlowSOM-class, [31](#)

flowsom.new, [31](#)

gates, [19](#), [33](#), [39](#), [50](#)

helper.channel_ids_from_long_names (helper_functions), [35](#)
helper.filter_names_to_ids_from_df (helper_functions), [35](#)
helper_functions, [35](#)

news, [36](#)

opt-SNE endpoints that return opt-SNE objects documented in the 'Details' section, [36](#)
optSNE-class, [36](#)

panels, [37](#)
panels.list, [3](#), [14](#), [35](#)
population, [33](#), [50](#)
populations, [39](#), [50](#)
populations.list, [3](#), [14](#)

sample_tags, [40](#)
scales, [19](#), [41](#)
Show Experiment Details, [50](#)
spade, [43](#)
SPADE endpoints that return SPADE objects documented in the 'Details' section, [49](#)
SPADE-class, [48](#)
spade.new, [49](#)
statistics, [49](#)

tsNE-class, [52](#)

UMAP endpoints that return UMAP objects documented in the 'Details' section, [53](#)
UMAP-class, [53](#)
users, [53](#)

UserSession-class, [55](#)

visne, [55](#)

viSNE-class, [58](#)