

Package ‘streamConnect’

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Title Connecting Stream Mining Components Using Sockets and Web Services

Description Adds functionality to connect stream mining components from package stream using sockets and Web services. The package can be used create distributed workflows and create plumber-based Web services which can be deployed on most common cloud services.

Depends stream (\geq 2.0-0)

Imports plumber, callr, httr, readr, stringr, jsonlite

Suggests knitr, httpuv, rmarkdown

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License GPL-3

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DSC_WebService	<i>A DSC Interface for a DSC Running as a Web Service</i>
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Description

Provides a DSC front-end for a clusterer running as a web service. The methods `nclusters()`, `get_center()`, `get_weights()` are supported.

Usage

```
DSC_WebService(url, quiet = TRUE)
```

Arguments

<code>url</code>	endpoint URI address in the format <code>http://host:port/<optional_path></code> .
<code>quiet</code>	logical; if FALSE then connection attempts messages will be displayed.

Value

A `stream::DSC` object.

See Also

Other WebService: [DSD_ReadWebService\(\)](#), [publish_DSC_via_WebService\(\)](#), [publish_DSD_via_WebService\(\)](#)
 Other dsc: [publish_DSC_via_WebService\(\)](#)

Examples

```
# find a free port
port <- httpuv::randomPort()
port

# deploy a clustering process listening for data on the port
rp1 <- publish_DSC_via_WebService("DSC_DBSTREAM(r = .05)", port = port)
rp1

# get a local DSC interface
dsc <- DSC_WebService(paste0("http://localhost:", port), quiet = FALSE)
dsc

# cluster
dsd <- DSD_Gaussians(k = 3, d = 2, noise = 0.05)

update(dsc, dsd, 500)

get_centers(dsc)
get_weights(dsc)
```

```
plot(dsc)

# kill the background clustering process.
rp1$kill()
rp1
```

DSD_ReadSocket *A DSD That Reads from a Server Port*

Description

Creates a `DSD_ReadStream` that reads from a port.

Usage

```
DSD_ReadSocket(host = "localhost", port, ...)
```

Arguments

host	hostname.
port	host port.
...	further arguments are passed on to DSD_ReadStream() .

Value

A `stream::DSD` object.

See Also

Other Socket: [publish_DSD_via_Socket\(\)](#)

Other dsd: [DSD_ReadWebService\(\)](#), [publish_DSD_via_Socket\(\)](#), [publish_DSD_via_WebService\(\)](#)

Examples

```
# find a free port
port <- httpuv::randomPort()
port

# create a background DSD process sending data to the port
rp1 <- DSD_Gaussians(k = 3, d = 3) %>% publish_DSD_via_Socket(port = port)
rp1

# create a DSD that connects to the socket. Note that we need to
# specify the column names of the stream
dsd <- DSD_ReadSocket(port = port, col.names = c("x", "y", "z", ".class"))
dsd
```



```
# create a DSD that connects to the web service
dsd <- DSD_ReadWebService(paste0("http://localhost:", port))
dsd

get_points(dsd, n = 10)

plot(dsd)

# end the DSD process. Note: that closing the connection above
# may already kill the process.
rp1$kill()
rp1
```

publish_DSC_via_WebService

Publish a Data Stream Clustering Task via a Web Service

Description

Uses the package [plumber](#) to publish a data stream task as a web service.

Usage

```
publish_DSC_via_WebService(  
  dsc,  
  port,  
  task_file = NULL,  
  serializer = "csv",  
  serve = TRUE,  
  background = TRUE,  
  debug = FALSE  
)
```

Arguments

dsc	A character string that creates a DSC.
port	port used to serve the task.
task_file	name of the plumber task script file.
serializer	method used to serialize the data. By default csv (comma separated values) is used. Other methods are json and rds (see plumber::serializer_csv).
serve	if TRUE, then a task file is written and a server started, otherwise, only a plumber task file is written.
background	logical; start a background process?
debug	if TRUE, then the service is started locally and a web client is started to explore the interface.

Details

The function writes a plumber task script file and starts the web server to serve the content of the stream using the endpoints

- GET /info
- POST /update requires the data to be uploaded as a file in csv format (see Examples section).
- GET /get_centers with parameter type (see [get_centers\(\)](#)).
- GET /get_weights with parameter type (see [get_weights\(\)](#)).

Supported serializers are csv (default), json, and rds.

APIs generated using plumber can be easily deployed. See: [Hosting](#). By setting a `task_file` and `serve = FALSE` a plumber task script file is generated that can deployment.

Value

a `processx::process` object created with `callr::r_bg()` which runs the plumber server in the background. The process can be stopped with `rp$kill()` or by killing the process using the operating system with the appropriate PID. `rp$get_result()` can be used to check for errors in the server process (e.g., when it terminates unexpectedly).

See Also

Other WebService: [DSC_WebService\(\)](#), [DSD_ReadWebService\(\)](#), [publish_DSD_via_WebService\(\)](#)

Other dsc: [DSC_WebService\(\)](#)

Examples

```
# find a free port
port <- httpuv::randomPort()
port

# Deploy a clustering process listening for data on the port
rp1 <- publish_DSC_via_WebService("DSC_DBSTREAM(r = .05)", port = port)
rp1

# look at ? DSC_WebService for a convenient interface.
# Here we we show how to connect to the port and send data manually.
library(httr)

# the info verb returns some basic information about the clusterer.
resp <- RETRY("GET", paste0("http://localhost:", port, "/info"))
d <- content(resp, show_col_types = FALSE)
d

# create a local data stream and send it to the clusterer using the update verb.
dsd <- DSD_Gaussians(k = 3, d = 2, noise = 0.05)

tmp <- tempfile()
stream::write_stream(dsd, tmp, n = 500, header = TRUE)
resp <- POST(paste0("http://localhost:", port, "/update"),
```

```

    body = list(upload = upload_file(tmp))
  unlink(tmp)
  resp

  # retrieve the cluster centers using the get_centers verb
  resp <- GET(paste0("http://localhost:", port, "/get_centers"))
  d <- content(resp, show_col_types = FALSE)
  head(d)

  plot(dsd, n = 100)
  points(d, col = "red", pch = 3, lwd = 3)

  # kill the process.
  rp1$kill()
  rp1

  # Debug the interface (run the service and start a web interface)
  if (interactive())
    publish_DSC_via_WebService("DSC_DBSTREAM(r = .05)",
                              port = port, debug = TRUE)

```

publish_DSD_via_Socket

Write a Stream to a Socket

Description

Use a `write_stream()` to write data to a socket connection.

Usage

```
publish_DSD_via_Socket(dsd, port, blocksize = 1024L, background = TRUE, ...)
```

Arguments

<code>dsd</code>	A DSD object.
<code>port</code>	port used to serve the DSD.
<code>blocksize</code>	number of data points pushed on the buffer at once.
<code>background</code>	logical; start a background process?
<code>...</code>	further arguments are passed on to socketConnection() .

Details

Provide access to a data stream using a local port.

Blocking: The DSD will be blocked once the buffer is full and resume producing data when it gets unblocked.

This method does not provide a header.

Value

a `processx::process` object created with `callr::r_bg()` which runs the plumber server in the background. The process can be stopped with `rp$kill()` or by killing the process using the operating system with the appropriate PID. `rp$get_result()` can be used to check for errors in the server process (e.g., when it terminates unexpectedly).

See Also

Other Socket: `DSD_ReadSocket()`

Other dsd: `DSD_ReadSocket()`, `DSD_ReadWebService()`, `publish_DSD_via_WebService()`

Examples

```
# find a free port
port <- httpuv::randomPort()
port

# create a background DSD process sending data to the port
rp1 <- DSD_Gaussians(k = 3, d = 3) %>% publish_DSD_via_Socket(port = port)
rp1

# connect to the port (retry waits for the socket to establish)
con <- retry(socketConnection(port = port, open = 'r'))
dsd <- retry(DSD_ReadStream(con, col.names = c("x", "y", "z", ".class")))

get_points(dsd, n = 10)

plot(dsd)

# close connection
close_stream(dsd)

# end the DSD process. Note: that closing the connection above
# may already kill the process.
rp1$kill()
rp1
```

publish_DSD_via_WebService

Publish a Data Stream via a Web Service

Description

Uses the package `plumber` to publish a data stream as a web service.

Usage

```
publish_DSD_via_WebService(
  dsd,
  port,
  task_file = NULL,
  serializer = "csv",
  serve = TRUE,
  background = TRUE,
  debug = FALSE
)
```

Arguments

dsd	A character string that creates a DSD.
port	port used to serve the DSD.
task_file	name of the plumber task script file.
serializer	method used to serialize the data. By default csv (comma separated values) is used. Other methods are json and rds (see plumber::serializer_csv).
serve	if TRUE, then a task file is written and a server started, otherwise, only a plumber task file is written.
background	logical; start a background process?
debug	if TRUE, then the service is started locally and a web client is started to explore the interface.

Details

The function writes a plumber task script file and starts the web server to serve the content of the stream using the endpoints

- http://localhost:port/get_points?n=100 and
- <http://localhost:port/info>.

APIs generated using plumber can be easily deployed. See: [Hosting](#). By setting a task_file and serve = FALSE a plumber task script file is generated that can be deployment.

A convenient reader for stream data over web services is available as [DSD_ReadWebService](#).

Value

a [processx::process](#) object created with [callr::r_bg\(\)](#) which runs the plumber server in the background. The process can be stopped with [rp\\$kill\(\)](#) or by killing the process using the operating system with the appropriate PID. [rp\\$get_result\(\)](#) can be used to check for errors in the server process (e.g., when it terminates unexpectedly).

See Also

Other WebService: [DSC_WebService\(\)](#), [DSD_ReadWebService\(\)](#), [publish_DSC_via_WebService\(\)](#)

Other dsd: [DSD_ReadSocket\(\)](#), [DSD_ReadWebService\(\)](#), [publish_DSD_via_Socket\(\)](#)

Examples

```

# find a free port
port <- httpuv::randomPort()
port

# create a background DSD process sending data to the port
rp1 <- publish_DSD_via_WebService("DSD_Gaussians(k = 3, d = 3)", port = port)
rp1

# connect to the port and read manually. See DSD_ReadWebService for
# a more convenient way to connect to the WebService in R.
library("httr")

# we use RETRY to give the server time to spin up
resp <- RETRY("GET", paste0("http://localhost:", port, "/info"))
d <- content(resp, show_col_types = FALSE)
d

# example: Get 100 points and plot them
resp <- GET(paste0("http://localhost:", port, "/get_points?n=100"))
d <- content(resp, show_col_types = FALSE)
head(d)

dsd <- DSD_Memory(d)
dsd
plot(dsd, n = -1)

# end the DSD process. Note: that closing the connection above
# may already kill the process.
rp1$kill()
rp1

# Publish using json
rp2 <- publish_DSD_via_WebService("DSD_Gaussians(k = 3, d = 3)",
  port = port, serializer = "json")
rp2

# connect to the port and read
# we use RETRY to give the server time to spin up
resp <- RETRY("GET", paste0("http://localhost:", port, "/info"))
content(resp, as = "text")

resp <- GET(paste0("http://localhost:", port, "/get_points?n=5"))
content(resp, as = "text")

# cleanup
rp2$kill()
rp2

# Debug the interface (run the service and start a web interface)
if (interactive())

```

```
publish_DSD_via_WebService("DSD_Gaussians(k = 3, d = 3)", port = port,  
  debug = TRUE)
```

retry *Retry an Expression that Fails*

Description

Retries and expression that fails. This is mainly used to retry establishing a connection.

Usage

```
retry(f, times = 5, wait = 1, verbose = FALSE)
```

Arguments

f	expression
times	integer; number of times
wait	number of seconds to wait in between tries.
verbose	logical; show progress and errors.

Value

the result of the expression f

Examples

```
retry(1)
```

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