

Package ‘RBioFormats’

September 16, 2024

Version 1.4.0

BioFormats 7.3.0

Title R interface to Bio-Formats

Description An R package which interfaces the OME Bio-Formats Java library to allow reading of proprietary microscopy image data and metadata.

Encoding UTF-8

biocViews DataImport

URL <https://github.com/aoles/RBioFormats>

BugReports <https://github.com/aoles/RBioFormats/issues>

Imports EBImage, methods, rJava (>= 0.9-6), S4Vectors, stats

Suggests BiocStyle, knitr, testthat, xml2

SystemRequirements Java (>= 1.7)

License GPL-3

VignetteBuilder knitr

Collate 'ImageMetadata.R' 'AnnotatedImage.R' 'RBioFormats.R'
'metadataAccessors.R' 'mockFile.R' 'read.image.R'
'read.metadata.R' 'read.omexml.R' 'utils.R' 'write.image.R'
'zzz.R'

RoxygenNote 7.2.3

git_url <https://git.bioconductor.org/packages/RBioFormats>

git_branch RELEASE_3_19

git_last_commit 56de4ee

git_last_commit_date 2024-04-30

Repository Bioconductor 3.19

Date/Publication 2024-09-15

Author Andrzej Oleś [aut, cre] (<<https://orcid.org/0000-0003-0285-2787>>),
John Lee [ctb] (<<https://orcid.org/0000-0001-5884-4247>>)

Maintainer Andrzej Oleś <andrzej.oles@gmail.com>

Contents

AnnotatedImage-class	2
AnnotatedImageList-class	3
checkJavaMemory	4
coreMetadata	4
dimorder	6
FormatTools	7
ImageMetadata-class	8
mockFile	9
RBioFormats	10
read.image	11
read.metadata	12
read.omexml	13
seriesCount	14
write.image	15
Index	16

AnnotatedImage-class *AnnotatedImage Class*

Description

Extends the [Image](#) class from the **EBImage** package.

Usage

```
AnnotatedImage(..., metadata = ImageMetadata())

## S3 method for class 'AnnotatedImage'
print(x, short = FALSE, ...)

## S4 method for signature 'AnnotatedImage'
show(object)

## S3 method for class 'AnnotatedImage'
as.Image(x)
```

Arguments

...	arguments passed to the Image constructor.
metadata	an ImageMetadata object containing image metadata
x	an AnnotatedImage object.
short	logical, turns off image data preview.
object	an AnnotatedImage object

Value

AnnotatedImage returns a new [AnnotatedImage](#) object.
as.Image returns an [Image](#) object.

Slots

metadata an [ImageMetadata](#) object containing image metadata

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

See Also

[AnnotatedImageList](#)

Examples

```
f = mockFile(sizeX = 256, sizeY = 256)
img = read.image(f)
img
```

AnnotatedImageList-class

AnnotatedImageList Class

Description

A list of [AnnotatedImage](#) objects.

Usage

```
AnnotatedImageList(...)
```

Arguments

... a list of [AnnotatedImage](#) objects to include in the new object.

Value

AnnotatedImageList returns a new [AnnotatedImageList](#) object.

Examples

```
f = mockFile(sizeX = 256, sizeY = 256, series = 2)
img = read.image(f)
img
```

checkJavaMemory *Java Memory Settings*

Description

Information about the Java heap space usage.

Usage

```
checkJavaMemory(units = "m")
```

Arguments

units Units to return the size in: "k", "m" or "g"

Value

The maximum amount of memory that the JVM will attempt to use, measured in units.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

Examples

```
## Not run:  
## assign 4 gigabytes of heap space to the Java environment.  
options( java.parameters = "-Xmx4g" )  
library( "RBioFormats" )  
  
## End(Not run)  
  
checkJavaMemory()
```

coreMetadata *Metadata Accessors*

Description

Get and set image metadata.

Usage

```
coreMetadata(x, series, ...)  
  
globalMetadata(x, series, ...)  
  
seriesMetadata(x, series, ...)  
  
## S4 method for signature 'ANY'  
metadata(x)  
  
## S4 method for signature 'AnnotatedImage'  
metadata(x)  
  
## S4 method for signature 'AnnotatedImageList'  
metadata(x)  
  
## S4 method for signature 'ImageMetadata'  
metadata(x)  
  
## S4 method for signature 'ImageMetadataList'  
metadata(x)  
  
## S4 replacement method for signature 'AnnotatedImage'  
metadata(x) <- value  
  
coreMetadata(y) <- value  
  
## S4 replacement method for signature 'AnnotatedImage'  
coreMetadata(y) <- value  
  
## S4 replacement method for signature 'ImageMetadata'  
coreMetadata(y) <- value  
  
globalMetadata(y) <- value  
  
## S4 replacement method for signature 'AnnotatedImage'  
globalMetadata(y) <- value  
  
## S4 replacement method for signature 'ImageMetadata'  
globalMetadata(y) <- value  
  
seriesMetadata(y) <- value  
  
## S4 replacement method for signature 'AnnotatedImage'  
seriesMetadata(y) <- value  
  
## S4 replacement method for signature 'ImageMetadata'  
seriesMetadata(y) <- value
```

Arguments

x	an AnnotatedImage , AnnotatedImageList , ImageMetadata , or ImageMetadataList object
series	series ID
...	arguments passed to grep
value	depending on the context, an ImageMetadata object or a list
y	an AnnotatedImage or ImageMetadata object

Details

The ... arguments are passed to [grep](#) called on metadata names allowing for convenient subsetting.

Value

Named list consisting of key value pairs.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

Examples

```
img = read.image(system.file("images", "nuclei.tif", package="EBImage"))
coreMetadata(img)
# subset for specific names
globalMetadata(img, pattern="Image")
```

dimorder

Image Frames Order

Description

Get the ordering of image frames.

Usage

```
dimorder(x)
```

Arguments

x	An Image object or an array
---	---

Value

A character vector giving the dimension names.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

Examples

```
# sample timelapse image
f = mockFile(sizeC=2, sizeT=10)
img = read.image(f)

dimorder(img)
```

FormatTools

Bio-Formats FormatTools Class

Description

A utility class for format reader and writer implementations.

Usage

```
FormatTools
```

Format

An object of class `jclassName` of length 1.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

Examples

```
# List available pixel types
sapply(0:7, FormatTools$getPixelTypeString)
```

ImageMetadata-class *ImageMetadata and ImageMetadataList Class*

Description

Formal representation of image metadata.

Usage

```
ImageMetadata(
  coreMetadata = NULL,
  globalMetadata = NULL,
  seriesMetadata = NULL
)

ImageMetadataList(...)

## S3 method for class 'ImageMetadata'
print(x, list.len = 5L, ...)

## S4 method for signature 'ImageMetadata'
show(object)

## S4 method for signature 'ImageMetadataList'
show(object)

## S3 method for class 'ImageMetadataList'
print(x, ...)
```

Arguments

coreMetadata	a list of core metadata entries
globalMetadata	a list of global metadata entries
seriesMetadata	a list of series metadata entries
...	further arguments to be passed to other methods
x	An ImageMetadata object
list.len	numeric; maximum number of metadata entries to display
object	an ImageMetadata object

Value

ImageMetadata returns a new [ImageMetadata](#) object.

ImageMetadataList returns a new [ImageMetadataList](#) object.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

Examples

```
f = mockFile(sizeX = 256, sizeY = 256)
img = read.image(f)
metadata(img)
```

mockFile	<i>Generate Test Images</i>
----------	-----------------------------

Description

Create a mock image of specific parameters for testing.

Usage

```
mockFile(name = "mockfile", ...)
```

Arguments

name	File name.
...	File parameters; available parameters are listed below.

Details

Generates mock files of specific size or pixel type containing gradient images. The desired parameters can be provided as key value pairs to the mockFile function. For a list of available parameters see below.

Value

A character string.

Parameters

Name	Default	Description
sizeX	512	horizontal size in pixels
sizeY	512	vertical size in pixels
sizeZ	1	number of Z sections
sizeC	1	number of channels
sizeT	1	number of time points
pixelType	uint8	string specifying pixel type: int8, uint8, int16, uint16, int32, uint32, float, double
bitsPerPixel	0	number of valid bits (<= number of bits implied by pixel type)
rgb	1	number of channels that are merged together
dimOrder	XYZCT	string describing dimension order

orderCertain	true	
little	true	whether or not the pixel data should be little-endian
interleaved	true	whether or not merged channels are interleaved
indexed	false	whether or not a color lookup table is present
falseColor	false	whether or not the color lookup table is just for making the image look pretty
series	1	number of series (Images)
lutLength	3	number of entries in the color lookup table

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

Examples

```
f = mockFile(sizeX = 256, sizeY = 256)
img = read.image(f)
img
```

RBioFormats

R Interface to Bio-Formats

Description

Interfaces the **Bio-Formats** Java library.

Usage

```
BioFormats.version()
```

Value

A character string containing the Bio-Formats library version.

Functions

- `BioFormats.version()`: Provides the version of the Bio-Formats library embedded in the package.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

References

[Bio-Formats website](#)

Examples

```
BioFormats.version()
```

read.image	<i>Read Images</i>
------------	--------------------

Description

Read image files using the Bio-Formats library. A list of supported formats can be found on the [Bio-Formats website](#).

Usage

```
read.image(
  file,
  filter.metadata = FALSE,
  proprietary.metadata = TRUE,
  normalize = TRUE,
  series,
  resolution,
  subset,
  read.metadata = TRUE
)
```

Arguments

file	character, file name
filter.metadata	logical, specifies whether ugly metadata (entries with unprintable characters, and extremely large entries) should be discarded from the metadata table
proprietary.metadata	logical, should proprietary metadata be populated to OME-XML
normalize	logical, should the original image data be mapped to the [0,1] range
series	integer vector specifying series to read; if missing all series included in the file are read
resolution	integer vector specifying resolution levels to read; if missing all levels read
subset	named list specifying image subsetting
read.metadata	logical, should image metadata be read

Value

An [AnnotatedImage](#) object or an [AnnotatedImageList](#) object in case of multi-series data.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

See Also

[read.metadata](#) for reading image metadata, [read.omexml](#) for reading image metadata as OME-XML

Examples

```
require(EBImage)
f = system.file("images", "sample-color.png", package="EBImage")

img = read.image(f)
img
```

read.metadata	<i>Read Image Metadata</i>
---------------	----------------------------

Description

Read image metadata using the Bio-Formats library. The list of supported file formats can be found on the [Bio-Formats website](#).

Usage

```
read.metadata(file, filter.metadata = FALSE, proprietary.metadata = TRUE)
```

Arguments

file	character, file name
filter.metadata	logical, specifies whether ugly metadata (entries with unprintable characters, and extremely large entries) should be discarded from the metadata table
proprietary.metadata	logical, should proprietary metadata be populated to OME-XML

Value

An [ImageMetadata](#) or [ImageMetadataList](#) object.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

See Also

[read.omexml](#) for reading image metadata as OME-XML, [read.image](#) for reading image data

Examples

```
require(EBImage)
f = system.file("images", "nuclei.tif", package="EBImage")

metadata = read.metadata(f)
str(metadata)
```

read.omexml

Read OME-XML Metadata

Description

Read the OME-XML DOM tree.

Usage

```
read.omexml(file, filter.metadata = FALSE, proprietary.metadata = TRUE)
```

Arguments

`file` character, file name

`filter.metadata` logical, specifies whether ugly metadata (entries with unprintable characters, and extremely large entries) should be discarded from the metadata table

`proprietary.metadata` logical, should proprietary metadata be populated to OME-XML

Value

A string containing a dumped OME-XML DOM tree.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

See Also

[read.metadata](#) for reading image metadata, [read.image](#) for reading image data

Examples

```
require(EBImage)
f = system.file("images", "nuclei.tif", package="EBImage")

omexml = read.omexml(f)
omexml
```

seriesCount	<i>Number of Image Series</i>
-------------	-------------------------------

Description

Get the number of image series contained in an object.

Usage

```
seriesCount(x)

## S4 method for signature 'ANY'
seriesCount(x)

## S4 method for signature 'matrix'
seriesCount(x)

## S4 method for signature 'array'
seriesCount(x)

## S4 method for signature 'ImageMetadata'
seriesCount(x)

## S4 method for signature 'AnnotatedImageList'
seriesCount(x)

## S4 method for signature 'ImageMetadataList'
seriesCount(x)
```

Arguments

x an images object.

Details

Image series are encoded by [AnnotatedImageList](#) or [ImageMetadataList](#) objects. Therefore, only these objects can possibly yield image series count higher than 1 while for all the rest of image objects this number is expected to be 1.

Value

The number of image series the object contains, see Details.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

Examples

```
f = mockFile(sizeX = 256, sizeY = 256, series = 2)
img = read.image(f)
seriesCount(img)

meta <- metadata(img)
seriesCount(meta)
```

write.image

Write Images

Description

Save image files using the Bio-Formats library. A list of supported formats can be found on the [Bio-Formats website](#).

Usage

```
write.image(x, file, force = FALSE, pixelType, littleEndian)
```

Arguments

x	an Image or AnnotatedImage object
file	character, file name
force	logical(1), if TRUE overwrite existing file
pixelType	character(1), data type to store pixel values
littleEndian	boolean(1), pixel data endianness

Value

File path to file is returned invisibly.

Author(s)

Andrzej Oleś <<andrzej.oles@gmail.com>>, 2014-2023

See Also

[read.image](#) for reading images.

Examples

```
f = mockFile(sizeX = 256, sizeY = 256)
img = read.image(f)

tempfile = tempfile("", , ".png")
write.image(img, tempfile)
```

Index

- * **datasets**
 - FormatTools, 7
 - .AnnotatedImage (AnnotatedImage-class), 2
 - .AnnotatedImageList (AnnotatedImageList-class), 3
 - .ImageMetadata (ImageMetadata-class), 8
 - .ImageMetadataList (ImageMetadata-class), 8

- AnnotatedImage, 2, 3, 6, 11, 15
- AnnotatedImage (AnnotatedImage-class), 2
- AnnotatedImage-class, 2
- AnnotatedImageList, 3, 6, 11, 14
- AnnotatedImageList (AnnotatedImageList-class), 3
- AnnotatedImageList-class, 3
- as.Image.AnnotatedImage (AnnotatedImage-class), 2

- BioFormats.version (RBioFormats), 10

- checkJavaMemory, 4
- coreMetadata, 4
- coreMetadata<- (coreMetadata), 4
- coreMetadata<-, AnnotatedImage-method (coreMetadata), 4
- coreMetadata<-, ImageMetadata-method (coreMetadata), 4

- dimorder, 6

- FormatTools, 7

- globalMetadata (coreMetadata), 4
- globalMetadata<- (coreMetadata), 4
- globalMetadata<-, AnnotatedImage-method (coreMetadata), 4
- globalMetadata<-, ImageMetadata-method (coreMetadata), 4
- grep, 6

- Image, 2, 3, 6
- ImageMetadata, 2, 3, 6, 8, 12
- ImageMetadata (ImageMetadata-class), 8
- ImageMetadata-class, 8
- ImageMetadataList, 6, 8, 12, 14
- ImageMetadataList (ImageMetadata-class), 8
- ImageMetadataList-class (ImageMetadata-class), 8

- metadata, AnnotatedImage-method (coreMetadata), 4
- metadata, AnnotatedImageList-method (coreMetadata), 4
- metadata, ANY-method (coreMetadata), 4
- metadata, ImageMetadata-method (coreMetadata), 4
- metadata, ImageMetadataList-method (coreMetadata), 4
- metadata<-, AnnotatedImage-method (coreMetadata), 4
- mockFile, 9

- print.AnnotatedImage (AnnotatedImage-class), 2
- print.ImageMetadata (ImageMetadata-class), 8
- print.ImageMetadataList (ImageMetadata-class), 8

- RBioFormats, 10
- read.image, 11, 12, 13, 15
- read.metadata, 12, 12, 13
- read.omexml, 12, 13

- seriesCount, 14
- seriesCount, AnnotatedImageList-method (seriesCount), 14
- seriesCount, ANY-method (seriesCount), 14
- seriesCount, array-method (seriesCount), 14

seriesCount, ImageMetadata-method
 (seriesCount), 14

seriesCount, ImageMetadataList-method
 (seriesCount), 14

seriesCount, matrix-method
 (seriesCount), 14

seriesMetadata (coreMetadata), 4

seriesMetadata<- (coreMetadata), 4

seriesMetadata<-, AnnotatedImage-method
 (coreMetadata), 4

seriesMetadata<-, ImageMetadata-method
 (coreMetadata), 4

show, AnnotatedImage-method
 (AnnotatedImage-class), 2

show, ImageMetadata-method
 (ImageMetadata-class), 8

show, ImageMetadataList-method
 (ImageMetadata-class), 8

write.image, 15