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Description Methods and data for color science - color conversions by observer, illuminant, and gamma. Color matching functions and chromaticity diagrams. Color indices, color differences, and spectral data conversion/analysis. This package is deprecated and will someday be removed; for reasons and details please see the README file.

License GPL (>= 3)

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ASTM.D1925.YellownessIndex

*ASTM D 1925 Yellowness Index for Plastics***Description**

ASTM.D1925.YellownessIndex was developed for the definition of the Yellowness of homogeneous, non-fluorescent, almost neutral-transparent, white-scattering or opaque plastics as they will be reviewed under daylight condition.

Usage

ASTM.D1925.YellownessIndex(XYZmatrix)

Arguments

XYZmatrix tri-stimulus values for the calculated for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.1146538, 0.08391198, 0.08222077)
ASTM.D1925.YellownessIndex(XYZ)
```

ASTM.E313.Whiteness *ASTM E313 Whiteness*

Description

ASTM.E313.Whiteness ASTM E313 Whiteness.

Usage

```
ASTM.E313.Whiteness(XYZmatrix)
```

Arguments

XYZmatrix tri-stimulus values for the calculated for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.1146538, 0.08391198, 0.08222077)
ASTM.E313.Whiteness(XYZ)
```

ASTM.E313.YellownessIndex
ASTM E313 Yellowness

Description

ASTM.E313.YellownessIndex ASTM E313 has successfully been used for a variety of white or near white materials.

Usage

ASTM.E313.YellownessIndex(XYZmatrix)

Arguments

XYZmatrix tri-stimulus values for the calculated for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.1146538, 0.08391198, 0.08222077)
ASTM.E313.YellownessIndex(XYZ)
```

Berger59.Whiteness *Berger (59) Whiteness*

Description

Berger59.Whiteness formula was developed by A. Berger (formerly employee of Bayer AG, Germany and was presented in 1959.

Usage

```
Berger59.Whiteness(xyYmatrix, illuminant = "C", observer = 2, RefWhite =
  get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

xyYmatrix	CIE values for illuminant C
illuminant	illuminant
observer	observer
RefWhite	White Reference

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
Berger59.Whiteness(xyY)
```

BVR2XYZ

convert from BVR coordinates to XYZ temperature (Robertson)

Description

BVR2XYZ convert from BVR coordinates to XYZ.

Usage

```
BVR2XYZ(BVRmatrix)
```

Arguments

BVRmatrix	BVR coordinates
-----------	-----------------

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

cccie31

CIE (1931) 2-deg chromaticity coordinates

Description

cccie31 is a table with CIE (1931) 2-deg chromaticity coordinates.

Usage

cccie31

Format

This data frame contains the following data:

wlnm wavelength (nm)

x x chromaticity coordinate

y y chromaticity coordinate

z z chromaticity coordinate

Author(s)

Jose Gama

Source

Commission Internationale de l'Eclairage Proceedings, 1931 Cambridge: Cambridge University Press.

References

Commission Internationale de l'Eclairage Proceedings, 1931 Cambridge: Cambridge University Press.

Examples

```
data(cccie31)
cccie31
```

`cccie64`*CIE (1964) 10-deg chromaticity coordinates*

Description

`cccie64` is a table with CIE (1964) 10-deg chromaticity coordinates.

Usage

```
cccie64
```

Format

This data frame contains the following data:

wlnm wavelength (nm)
x x chromaticity coordinate
y y chromaticity coordinate
z z chromaticity coordinate

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(cccie64)
cccie64
```

CCT2XYZ	<i>Convert CCT to XYZ</i>
---------	---------------------------

Description

CCT2XYZ Converts correlated color temperature (CCT) to CIE tristimulus XYZ.

Usage

CCT2XYZ(CCTmatrix)

Arguments

CCTmatrix CCT values

Value

CIE tristimulus XYZ

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com/>

References

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com/>

Examples

CCT2XYZ(c(0.310897, 0.306510, 74.613450))

CentralsISCCNBS	<i>Central notations for the revised ISCC-NBS</i>
-----------------	---

Description

CentralsISCCNBS is a table with Central notations for the revised ISCC-NBS Color-Name Blocks.

Usage

CentralsISCCNBS

Format

This data frame contains the following data:

Number notation number

Name notation name

MunsellSpec Munsell specification

Author(s)

Glenn Davis

References

Kelly, Kenneth Low, 1910 Central notations for the revised ISCC-NBS Color-Name Blocks Journal of Research of the National Bureau of Standards Research Paper 2911, Vol. 61 No. 5, November 1958

Examples

```
data(CentralsISCCNBS)
CentralsISCCNBS
```

CheckColorLookup

Check that the color block number is correct

Description

CheckColorLookup Checks that the color block number is correct.

Usage

```
CheckColorLookup(DataISCCNBS)
```

Arguments

DataISCCNBS data.frame with columns MunsellSpec and Number

Value

logic

Author(s)

Glenn Davis

ChromaticAdaptation *Chromatic adaptation algorithms*

Description

ChromaticAdaptation chromatic adaptation algorithms implemented as a linear transformation (XYZ Scaling, Bradford and Von Kries).

Usage

ChromaticAdaptation

Format

This array frame contains the following dimensions:

- 1 rows transformation matrix 3x3
- 2 columns transformation matrix 3x3
- 3 linear transformation (XYZ Scaling, Bradford or Von Kries)
- 4 transformation "direct" or "inverse"

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com/>

References

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com/>

Examples

```
data(ChromaticAdaptation)
ChromaticAdaptation
```

chromaticity.diagram *Plot the chromaticity diagram*

Description

chromaticity.diagram Plots the chromaticity diagram AKA "horse shoe".

Usage

```
chromaticity.diagram(chromaticityCoordinates=get("cccie31", envir = environment()),  
conversionFunction=NULL, ...)
```

Arguments

chromaticityCoordinates
chromaticity coordinates

conversionFunction
optional function to perform the coordinate conversion

...
optional parameters for the plot command

Value

none

Author(s)

Jose Gama

Examples

```
chromaticity.diagram()  
xl<-yl<-0:1  
chromaticity.diagram(xlim=xl,ylim=yl)  
chromaticity.diagram(conversionFunction=CIE1931XYZ2CIE1976uv, xlim=xl,ylim=yl,  
xlab="u",ylab="v")
```

chromaticity.diagram.color

Plot the chromaticity diagram line with color

Description

chromaticity.diagram.color Plots the chromaticity diagram AKA "horse shoe", as a black line, a color line or a polygon.

Usage

```
chromaticity.diagram.color(chromaticityCoordinates=get("cccie31", envir = environment()),
  conversionFunction=NULL, granularity=10, ...)
```

Arguments

```
chromaticityCoordinates      chromaticity coordinates
conversionFunction           optional function to perform the coordinate conversion
granularity                  granularity = number of calculated points
...                          optional parameters for the plot command
```

Value

none

Author(s)

Jose Gama

Examples

```
chromaticity.diagram.color()
xl<-yl<-0:1
chromaticity.diagram.color(xlim=xl,ylim=yl)
chromaticity.diagram.color(conversionFunction=CIE1931XYZ2CIE1976uv, xlim=xl,
  ylim=yl,xlab="u'",ylab="v'")
```

CIE.Whiteness

CIE Whiteness

Description

CIE.Whiteness The CIE Whiteness index is widely used in the industry for D65 for 2 or 10 deg observer.

Usage

```
CIE.Whiteness(xyYmatrix, illuminant = "D65", observer = 2, RefWhite
  = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

```
xyYmatrix      xyY data
illuminant     illuminant
observer       observer
RefWhite       Reference White
```

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
CIE.Whiteness(xyY)
```

CIE1931xy2CIE1960uv *Convert CIE 1931 xy color space to CIE 1960 uv color space*

Description

CIE1931xy2CIE1960uv Converts CIE 1931 xy color space to CIE 1960 uv color space.

Usage

CIE1931xy2CIE1960uv(xymatrix)

Arguments

xymatrix xy coordinates

Value

CIE 1960 uv coordinates

Author(s)

Jose Gama

SourceWikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
xyY <- cbind(0.4083308, 0.2988462, 0.08391198)
CIE1931xy2CIE1960uv(xyY)
```

CIE1931xy2CIE1976uv *Convert CIE 1931 xy color space to CIE 1976 uv color space*

Description

CIE1931xy2CIE1976uv Converts CIE 1931 xy color space to CIE 1976 uv color space.

Usage

```
CIE1931xy2CIE1976uv(xymatrix)
```

Arguments

xymatrix xy coordinates

Value

CIE 1976 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
xyY <- cbind(0.4083308, 0.2988462, 0.08391198)
CIE1931xy2CIE1976uv(xyY)
```

CIE1931XYZ2CIE1931xyz *Convert CIE 1931 XYZ color space to CIE 1931 xyz color space*

Description

CIE1931XYZ2CIE1931xyz Converts CIE 1931 XYZ color space to CIE 1931 xyz color space.

Usage

CIE1931XYZ2CIE1931xyz(XYZmatrix)

Arguments

XYZmatrix XYZ coordinates

Value

CIE 1931 xyz coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIE1931XYZ2CIE1931xyz(XYZ)
```

CIE1931XYZ2CIE1960uv *Convert CIE 1931 XYZ color space to CIE 1960 uv color space*

Description

CIE1931XYZ2CIE1960uv Converts CIE 1931 XYZ color space to CIE 1960 uv color space.

Usage

```
CIE1931XYZ2CIE1960uv(XYZmatrix)
```

Arguments

XYZmatrix XYZ coordinates

Value

CIE 1960 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)  
CIE1931XYZ2CIE1960uv(XYZ)
```

CIE1931XYZ2CIE1976uv *Convert CIE 1931 XYZ color space to CIE 1976 uv color space*

Description

CIE1931XYZ2CIE1976uv Converts CIE 1931 XYZ color space to CIE 1976 uv color space.

Usage

CIE1931XYZ2CIE1976uv(XYZmatrix)

Arguments

XYZmatrix XYZ coordinates

Value

CIE 1976 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIE1931XYZ2CIE1976uv(XYZ)
```

CIE1960UCS2CIE1964 *Convert CIE 1960 UCS color space to CIE 1964 color space*

Description

CIE1960UCS2CIE1964 Converts CIE 1960 UCS color space to CIE 1964 color space.

Usage

```
CIE1960UCS2CIE1964(uvYmatrix, illuminant = "D65", observer = 2, RefWhite =  
get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

uvYmatrix	uvY data
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

CIE 1976 uv coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1964 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

```
CIE1960UCS2CIE1964(c(0.1633789, 1.322222, 0.08391198))
```

CIE1960UCS2xy

Convert CIE 1960 UCS color space to 1960 xy color space

Description

CIE1960UCS2xy Converts CIE 1960 UCS color space to 1960 xy color space.

Usage

CIE1960UCS2xy(uvMatrix)

Arguments

uvMatrix uv coordinates

Value

CIE 1960 xy coordinates

Author(s)

Jose Gama

Source

Wikipedia, 2014 CIE 1964 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

References

Wikipedia, 2014 CIE 1931 color space https://en.wikipedia.org/wiki/CIE_1931_color_space#CIE_xy_chromaticity_diagram_and_the_CIE_xyY_color_space

Examples

CIE1960UCS2xy(c(0.1633789, 1.322222))

CIE1976chroma

CIE 1976 chroma formula for CIELab and CIELuv

Description

CIE1976chroma CIE 1976 chroma formula for CIELab and CIELuv.

Usage

CIE1976chroma(CIELMatrix)

Arguments

CIELMatrix CIELab or CIELuv data

Author(s)

Jose Gama

Source

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

References

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

Examples

```
CIELMatrix<-c(34.78467, 28.15159, 3.024663)
CIE1976chroma(CIELMatrix)
```

CIE1976hueangle

CIE 1976 hue angle formula for CIELab and CIELuv

Description

CIE1976hueangle CIE 1976 hue angle formula for CIELab and CIELuv.

Usage

CIE1976hueangle(CIELMatrix)

Arguments

CIELMatrix CIELab or CIELuv data

Author(s)

Jose Gama

Source

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

References

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

Examples

```
CIELMatrix<-c(34.78467, 28.15159, 3.024663)
CIE1976hueangle(CIELMatrix)
```

CIE1976uv2CIE1931xy *CIE-1976 u'v' to CIE-1931 xy*

Description

CIE1976uv2CIE1931xy CIE-1976 u'v' to CIE-1931 xy.

Usage

```
CIE1976uv2CIE1931xy(uvmatrix)
```

Arguments

uvmatrix CIE-1976 u'v' data

Author(s)

Jose Gama

Source

Paul Schils, 2014 Color theory phenomena <http://www.color-theory-phenomena.nl/10.03.htm>

References

Paul Schils, 2014 Color theory phenomena <http://www.color-theory-phenomena.nl/10.03.htm>

Examples

```
CIE1976uv2CIE1931xy(c(0.2830965, 0.4661789))
```

CIE1976uv2CIE1960uv *CIE-1976 u'v' to CIE-1960 uv*

Description

CIE1976uv2CIE1960uv CIE-1976 u'v' to CIE-1960 uv.

Usage

```
CIE1976uv2CIE1960uv(uvmatrix)
```

Arguments

uvmatrix CIE-1976 u'v' data

Author(s)

Jose Gama

Source

Paul Schils, 2014 Color theory phenomena <http://www.color-theory-phenomena.nl/10.03.htm>

References

Paul Schils, 2014 Color theory phenomena <http://www.color-theory-phenomena.nl/10.03.htm>

Examples

```
CIE1976uv2CIE1960uv(c(0.2830965, 0.4661789))
```

CIE1976uvSaturation *CIE 1976 uv Saturation*

Description

CIE1976uvSaturation CIE 1976 uv Saturation.

Usage

```
CIE1976uvSaturation(uvMatrix, whitepoint)
```

Arguments

uvMatrix	CIE Luv data
whitepoint	white point

Author(s)

Jose Gama

Source

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

References

R. W. G. Hunt, M. R. Pointer, 2011 Measuring Colour Volume 23 of The Wiley-IS&T Series in Imaging Science and Technology John Wiley & Sons

Examples

```
CIE1976uvSaturation(cbind(34.78467, 28.15159, 3.024663), as.numeric(
  get("XYZperfectreflectingdiffuser",
  envir = environment())[which(get("XYZperfectreflectingdiffuser",
  envir = environment())["Illuminant"]=='C'),c('X2','Y2')))
```

CIELabtoDIN99

Conversion from CIELAB color space to DIN99 coordinates

Description

CIELabtoDIN99 Converts from CIELAB color space to DIN99 coordinates.

Usage

CIELabtoDIN99(Lab)

Arguments

Lab CIELAB

Value

DIN99

Author(s)

Jose Gama

Source

CIELAB to DIN99 coordinates, 2014 <https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum>

References

CIELAB to DIN99 coordinates, 2014 <https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum>

Examples

CIELabtoDIN99(c(0.310897, 0.306510, 74.613450))

CIEluminanceY2NCSblackness

approximated NCS blackness s by the CIE luminance factor Y

Description

CIEluminanceY2NCSblackness approximated NCS blackness s by the CIE luminance factor Y.

Usage

```
CIEluminanceY2NCSblackness(Y)
```

Arguments

Y CIE values for illuminant C

Author(s)

Jose Gama

Source

Hsien-Che Lee, 2005 Introduction to Color Imaging Science Cambridge University Press pp. 366

References

Hsien-Che Lee, 2005 Introduction to Color Imaging Science Cambridge University Press pp. 366

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
CIEluminanceY2NCSblackness(xyY[3])
```

CIETint

Tint indices: CIE Tint and ASTM E313 Tint

Description

CIETint Tint indices: CIE Tint and ASTM E313 Tint.

Usage

```
CIETint(xymatrix,illuminant='D65',observer=2)
```

Arguments

xymatrix	matrix with xy data
illuminant	illuminant
observer	observer

Value

Tint

Author(s)

Jose Gama

Source

CIE, 2004 CIE Publication 15:2004, "Colorimetry" ASTM E313, "Standard Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates"

References

CIE, 2004 CIE Publication 15:2004, "Colorimetry" ASTM E313, "Standard Practice for Calculating Yellowness and Whiteness Indices from Instrumentally Measured Color Coordinates"

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
CIETint(xyY)
```

cixyz31

CIE 1931 2-deg, XYZ CMFs

Description

cixyz31 is a table with CIE 1931 2-deg, XYZ color matching functions.

Usage

```
cixyz31
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

xbar x CMF

ybar y CMF

zbar z CMF

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(ciexyz31)
ciexyz31
```

ciexyz64

CIE 1964 10-deg, XYZ CMFs

Description

ciexyz64 is a table with CIE 1964 10-deg, XYZ color matching functions.

Usage

```
ciexyz64
```

Format

This data frame contains the following data:

wl nm wavelength (nm)

x bar x CMF

y bar y CMF

z bar z CMF

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(cixyz64)
cixyz64
```

CMY2CMYK

Convert CMY coordinates to CMYK

Description

CMY2CMYK Converts CMY coordinates to CMYK.

Usage

```
CMY2CMYK(CMYmatrix)
```

Arguments

CMYmatrix CMY coordinates

Value

CMYK coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
CMY2CMYK(c(0.59072, 0.85570, 0.80283))
```

CMY2RGB

Convert CMYK coordinates to RGB

Description

CMY2RGB Converts CMYK coordinates to RGB.

Usage

CMY2RGB(CMYmatrix)

Arguments

CMYmatrix CMY coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

CMY2RGB(c(0.310897, 0.306510, 74.613450))

CMYK2CMY

Convert CMYK coordinates to CMY

Description

CMYK2CMY Converts CMYK coordinates to CMY.

Usage

CMYK2CMY(CMYKmatrix)

Arguments

CMYKmatrix CMYK coordinates

Value

CMY coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
CMYK2CMY(c(.342, .768, .683, .378))
```

ColorBlockFromMunsell *Get HVC, ISCC-NBS Number and ISCC-NBS Name from Munsell notation*

Description

ColorBlockFromMunsell Get HVC, ISCC-NBS Number and ISCC-NBS Name from Munsell notation.

Usage

```
ColorBlockFromMunsell(HVC)
```

Arguments

HVC Munsell hue, value and chroma

Format

HVC[1]] Munsell hue, on the ASTM D1535 100 point circular scale. All values are valid.

HVC[2]] Munsell value, must be between 0 and 10

HVC[3]] Munsell chroma, must be non-negative

Value

HVC, ISCC-NBS Number, ISCC-NBS Name

Author(s)

Glenn Davis

compuphaseDifferenceRGB

compuphase Difference RGB

Description

compuphaseDifferenceRGB compuphase Difference RGB.

Usage

compuphaseDifferenceRGB(RGB1, RGB2)

Arguments

RGB1	RGB color sample
RGB2	RGB color reference

Value

Delta E

Author(s)

Jose Gama

Source

Thiadmer Riemersma, 2012 CompuPhase <https://www.compuphase.com/cmetric.htm>

References

Thiadmer Riemersma, 2012 CompuPhase <https://www.compuphase.com/cmetric.htm>

Examples

compuphaseDifferenceRGB(c(124,63,78),c(241,65,78))

conversionIlluminance *Conversion Factors for Units of Illuminance*

Description

conversionIlluminance is a table of conversion factors for units of Illuminance

Usage

```
conversionIlluminance
```

Format

This data frame contains the following columns:

footcandles foot-candles

lux lm/m² = lux

phot phot

milliphot milliphot

units units

Author(s)

Jose Gama

Source

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

References

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

Examples

```
data(conversionIlluminance)  
conversionIlluminance
```

conversionLuminance *Conversion Factors for Units of Luminance*

Description

conversionLuminance is a table of conversion factors for units of Luminance

Usage

```
conversionLuminance
```

Format

This data frame contains the following columns:

cd.m.2 cd/m² = nit

cd.cm.2 cd/cm² = stilb

cd.ft.2 cd/ft²

cd.in.2 cd/in²

apostilb apostilb = blondel

millilambert millilambert

footlambert foot-lambert

Author(s)

Jose Gama

Source

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

References

J. Meyer-Arendt, "Radiometry and Photometry: Units and Conversion Factors," Appl. Opt. 7, 2081-2081 (1968).

Examples

```
data(conversionLuminance)
conversionLuminance
```

createIsoTempLinesTable
table of isothermperature lines for use with the Robertson Method

Description

createIsoTempLinesTable table of isothermperature lines for use with the Robertson Method (Robertson, 1968) to interpolate isothermperature lines from the CIE 1960 UCS.

Usage

```
createIsoTempLinesTable(SPD=NA,CIETable = get("cixyz31", envir = environment()),  
TCS = get("TCSdata", envir = environment()))
```

Arguments

SPD	light source spd
CIETable	reference data values
TCS	spectral reflectance data of 14 color test samples for CRI

Value

Iso temperature lines table

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpiip/lightinganswers/pdf/print/lightsources.pdf>

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpiip/lightinganswers/pdf/print/lightsources.pdf>

Examples

```
# illuminant A  
SPD = illuminants[1:51*2-1,c('wlnm','A')] # every 10 nm  
isoTempLinesTable <- createIsoTempLinesTable(SPD)
```

daylightcomponents *daylight components*

Description

daylightcomponents table with the mean relative spectral radiant power distribution and first two eigenvectors for the CIE method of calculating daylight.

Format

This data frame contains the following columns:

wlnm wavelength in nm

S0 mean relative spectral radiant power distribution

S1 first eigenvector

S2 second eigenvector

Author(s)

Jose Gama

Source

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

References

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

Examples

```
data(daylightcomponents)
str(daylightcomponents)
```

deltaE1976	<i>Delta E (CIE 1976)</i>
------------	---------------------------

Description

deltaE1976 The color difference Delta E (CIE 1976).

Usage

deltaE1976(Lab1, Lab2)

Arguments

Lab1	CIE Lab color sample
Lab2	CIE Lab color reference

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

References

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaE1976(RGB1,RGB2)
```

`deltaE1994`*Delta E (CIE 1994)*

Description

`deltaE1994` The color difference Delta E (CIE 1994).

Usage

```
deltaE1994(Lab1, Lab2, textiles = FALSE)
```

Arguments

<code>Lab1</code>	CIE Lab color sample
<code>Lab2</code>	CIE Lab color reference
<code>textiles</code>	boolean, TRUE = version for textiles

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

References

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaE1994(RGB1,RGB2)
```

deltaE2000	<i>Delta E (CIE 2000)</i>
------------	---------------------------

Description

deltaE2000 The color difference Delta E (CIE 2000).

Usage

```
deltaE2000(Lab1, Lab2)
```

Arguments

Lab1	CIE Lab color sample
Lab2	CIE Lab color reference

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

References

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaE2000(RGB1,RGB2)
```

`deltaECMC`*Delta E CMC*

Description

`deltaECMC` The color difference method of the Color Measurement Committee (the CMC) .

Usage

```
deltaECMC(Lab1, Lab2, L, C)
```

Arguments

Lab1	CIE Lab color sample
Lab2	CIE Lab color reference
L	parameter L
C	parameter C

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

References

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

Examples

```
RGB1<-c(124,63,78)
RGB2<-c(95,213,184)
deltaECMC(RGB1,RGB2)
```

DeMarcoPokornySmith2degConeFundamentals1992

DeMarco, Pokorny & Smith (1992) versions of the Smith-Pokorny 2-deg fundamentals

Description

DeMarcoPokornySmith2degConeFundamentals1992 DeMarco, Pokorny & Smith (1992) versions of the Smith-Pokorny 2-deg fundamentals based on the CIE Judd-Vos 2-deg CMFs.

Usage

DeMarcoPokornySmith2degConeFundamentals1992

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(DeMarcoPokornySmith2degConeFundamentals1992)
DeMarcoPokornySmith2degConeFundamentals1992
```

DIN6167.YellownessIndex

CIE Whiteness

Description

DIN6167.YellownessIndex The CIE Whiteness index is widely used in the industry for D65 for 2 or 10 deg observer.

Usage

```
DIN6167.YellownessIndex(XYZmatrix, illuminant = "C", observer = 2, RefWhite  
= get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	CIE values for illuminant C
illuminant	illuminant
observer	observer
RefWhite	Reference White

Author(s)

Jose Gama

Source

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

References

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)  
DIN6167.YellownessIndex(XYZ)
```

DIN99toCIELab

Conversion from DIN99 coordinates to CIELAB color space

Description

DIN99toCIELab Conversion from DIN99 coordinates to CIELAB color space.

Usage

DIN99toCIELab(Lab99o)

Arguments

Lab99o Lab99o coordinates

Value

CIELAB coordinates

Author(s)

Jose Gama

Source

DIN99 coordinates to CIELAB color space <https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum>

References

DIN99 coordinates to CIELAB color space <https://de.wikipedia.org/w/index.php?title=Diskussion:DIN99-Farbraum>

Examples

DIN99toCIELab(c(0.59072, 0.85570, 0.80283))

`dkl2dklCart`*converts between spherical and cartesian coordinates for DKL*

Description

`dkl2dklCart` Converts DKL, from spherical coordinates to cartesian. `dklCart2rgb` Converts DKL, from cartesian to spherical coordinates.

Usage

```
dkl2dklCart(dklMatrix)
```

Arguments

`dklMatrix` DKL coordinates

Value

DKL coordinates

Author(s)

Jose Gama

Source

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

References

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

Examples

```
RGB<-c(124,63,78)
d <- rgb2dklCart(RGB)
dklCart2dkl(d)
dkl2dklCart(c(1.647176, 60.8308, 91.45825))
d
```

dkl2rgb	<i>convert RGB to DKL</i>
---------	---------------------------

Description

dkl2rgb Converts DKL, spherical coords coordinates to sRGB. dklCart2rgb Converts DKL, cartesian coords coordinates to sRGB.

Usage

```
dkl2rgb(dklMatrix, conversionMatrix = NA)
```

Arguments

dklMatrix	DKL coordinates
conversionMatrix	conversion matrix

Value

RGB coordinates

Author(s)

Jose Gama

Source

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

References

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

Examples

```
dklC <- rgb2dklCart(c(54, 75, 121))  
dklCart2dkl(dklC)
```

DominantWavelength *Converts xyY coordinates to wavelength*

Description

DominantWavelength Converts xyY coordinates to wavelength.

Usage

```
DominantWavelength(xyYmatrix, illuminant='D65',observer=2,  
RefWhiteIllum=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

xyYmatrix	xyY matrix
illuminant	illuminant
observer	observer
RefWhiteIllum	Reference White

Value

Dominant Wavelength

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 <http://www.brucelindbloom.com/index.html?ColorCalculator.html>

References

Bruce Justin Lindbloom, 2013 <http://www.brucelindbloom.com/index.html?ColorCalculator.html>

Examples

```
DominantWavelength(c(0.59072, 0.85570, 0.80283))
```

`emittanceblackbodyPlanck`*emittance of a black body of temperature T at a given wavelength*

Description

`emittanceblackbodyPlanck` emittance of a black body of temperature T at a given wavelength (in metres).

Usage

```
emittanceblackbodyPlanck(wlnm, T)
```

Arguments

<code>wlnm</code>	wavelength in nm
<code>T</code>	temperature in Kelvin

Value

emittance

Author(s)

Jose Gama

Source

Planck's radiation law https://en.wikipedia.org/wiki/Planck%27s_law

References

Planck's radiation law https://en.wikipedia.org/wiki/Planck%27s_law

Examples

```
emittanceblackbodyPlanck(555,2000)
```

footcandle2candela.steradian.sqmeter

converts foot candle to candela steradian / square meter

Description

footcandle2candela.steradian.sqmeter converts foot candle to candela steradian / square meter [cd*sr/m²].

Usage

```
footcandle2candela.steradian.sqmeter(ftcl)
```

Arguments

ftcl	foot candle
------	-------------

Value

watts / square centimeter

Author(s)

Jose Gama

Source

Translators cafe <https://www.translatorscafe.com/unit-converter/en-US/illumination>

References

Translators cafe <https://www.translatorscafe.com/unit-converter/en-US/illumination>

Examples

```
footcandle2candela.steradian.sqmeter(5)
```

footcandle2lux *convert foot candle to Lumens/lux*

Description

footcandle2lux converts foot candle to Lumens/lux.

Usage

```
footcandle2lux(ftcl)
```

Arguments

ftcl foot candle

Value

Lumens/lux

Author(s)

Jose Gama

Source

Translators cafe <https://www.translatorscafe.com/unit-converter/en-US/illumination>

References

Translators cafe <https://www.translatorscafe.com/unit-converter/en-US/illumination>

Examples

```
footcandle2lux(5)
```

footcandle2watt.sqcentimeter
converts foot candle to watts / square centimeter

Description

footcandle2watt.sqcentimeter converts foot candle to watts / square centimeter [w/cm²] (at 555 nm) .

Usage

```
footcandle2watt.sqcentimeter(ftcl)
```

Arguments

ftcl foot candle

Value

watts / square centimeter

Author(s)

Jose Gama

Source

Translators cafe <https://www.translatorscafe.com/unit-converter/en-US/illumination>

References

Translators cafe <https://www.translatorscafe.com/unit-converter/en-US/illumination>

Examples

footcandle2watt.sqcentimeter(5)

GanzGrieser.Tint

Ganz and Grieser Tint

Description

GanzGrieser.Tint Ganz Grieser Tint Method.

Usage

GanzGrieser.Tint(xyYmatrix)

Arguments

xyYmatrix CIE xyY values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
GanzGrieser.Tint(xyY)
```

GanzGrieser.Whiteness *Ganz and Grieser Whiteness*

Description

GanzGrieser.Whiteness Dr. E. Ganz (formerly employee of Ciba AG, Switzerland) and Mr.R. Grieser (formerly employee of J.R.Geigy) developed the Ganz Grieser Whiteness Method.

Usage

```
GanzGrieser.Whiteness(xyYmatrix)
```

Arguments

xyYmatrix CIE xyY values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
GanzGrieser.Whiteness(xyY)
```

heuristic.wlnm2RGB *Approximations from wavelengths to RGB*

Description

heuristic.wlnm2RGB Approximations from wavelengths to RGB.

Usage

```
heuristic.wlnm2RGB(wavelength, Gamma = 0.8, IntensityMax = 1)
```

Arguments

wavelength	wavelength data
Gamma	Gamma
IntensityMax	maximum intensity

Value

RGB coordinates

Author(s)

Jose Gama

Source

Dan Bruton's, 2004 <http://www.midnightkite.com/color.html> Earl F. Glynn 2006 Delphi conversion <http://www.efg2.com/Lab/ScienceAndEngineering/Spectra.htm>

References

Dan Bruton's, 2004 <http://www.midnightkite.com/color.html> Earl F. Glynn 2006 Delphi conversion <http://www.efg2.com/Lab/ScienceAndEngineering/Spectra.htm>

Examples

```
heuristic.wlnm2RGB(555)
```

HSL2RGB

Convert HSL coordinates to RGB

Description

HSL2RGB Converts HSL coordinates to RGB.

Usage

```
HSL2RGB(HSLmatrix)
```

Arguments

HSLmatrix HSL coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
HSL<-c(0.9590164, 0.3262032, 0.3666667)
HSL2RGB(HSL)
HSL2RGB(rbind(HSL,HSL,HSL,HSL,HSL))
```

HSV2RGB

Convert HSV coordinates to RGB

Description

HSV2RGB Converts HSV coordinates to RGB.

Usage

```
HSV2RGB(HSVmatrix)
```

Arguments

HSVmatrix HSV coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
HSV<-c(0.9590164, 0.4919355, 0.4862745)  
HSV2RGB(HSV)
```

Hue.2.RGB

Convert Hue to RGB

Description

Hue.2.RGB Converts Hue to RGB for HSL conversion.

Usage

Hue.2.RGB(v1, v2, vH)

Arguments

v1	value 1
v2	value 2
vH	value of hue

Value

RGB coordinates

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

Examples

Hue.2.RGB(1, 2, 3)

huedegree *convert Munsell hue to degree*

Description

huedegree convert Munsell hue to degree.

Usage

huedegree(MunIn)

Arguments

MunIn Munsell hue color

Value

Munsell hue degree

Author(s)

Jose Gama

Source

Takahiro Onodera, 2010 Color-Model-Munsell-Util <http://annocpan.org/dist/Color-Model-Munsell-Util>

References

Takahiro Onodera, 2010 Color-Model-Munsell-Util <http://annocpan.org/dist/Color-Model-Munsell-Util>

Examples

huedegree('1P')

huegreemunsell *Table with Munsell hue degrees*

Description

huegreemunsell table with Munsell hue degrees.

Usage

huegreemunsell

Format

This data frame contains the following columns:

HueDegree hue degree

HueMunsell hue in Munsell H

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(huedegreemunsell)
huedegreemunsell
```

Hunter60.WhitenessIndex

Hunter 60 Whiteness Index

Description

Hunter60.WhitenessIndex Hunter 60 Whiteness Index.

Usage

```
Hunter60.WhitenessIndex(LabHunterMatrix)
```

Arguments

LabHunterMatrix
 Lab Hunter values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
HunterLab<-c(28.96756, 2.363884, 0.4821515)
Hunter60.WhitenessIndex(HunterLab)
```

HunterLab2XYZ *Convert HunterLab coordinates to XYZ*

Description

HunterLab2XYZ Converts HunterLab coordinates to XYZ.

Usage

```
HunterLab2XYZ(HunterLabmatrix, illuminant = "D65", observer = 2,
  RefWhite = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

HunterLabmatrix	HunterLab coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

XYZ coordinates

Author(s)

Jose Gama

SourceLogicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>**References**Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>**Examples**

HunterLab2XYZ(c(0.310897, 0.306510, 74.613450))

illuminantA	<i>Relative spectral power distributions of CIE illuminant A at 1 nm interval</i>
-------------	---

Description

illuminantA is a table with Relative spectral power distributions of CIE illuminant A at 1 nm interval.

Usage

illuminantA

Format

This data frame contains the following data:

wlnm wavelength (nm)

intensity Relative spectral power

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(illuminantA)
illuminantA
```

illuminantD65	<i>Relative spectral power distributions of CIE illuminant D65 at 1 nm interval</i>
---------------	---

Description

illuminantD65 is a table with Relative spectral power distributions of CIE illuminant D65 at 1 nm interval.

Usage

```
illuminantD65
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

intensity Relative spectral power

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(illuminantD65)
illuminantD65
```

illuminants	<i>Relative spectral power distributions of CIE illuminants at 5 nm interval</i>
-------------	--

Description

illuminants is a table with Relative spectral power distributions of CIE illuminants at 5 nm interval.

Usage

illuminants

Format

This data frame contains the following data:

wlnm wavelength (nm)

A illuminant A

B illuminant B

C illuminant C

D50 illuminant D50

D55 illuminant D55

D65 illuminant D65

D75 illuminant D75

D93 illuminant D93

E illuminant E

Natural illuminant Natural

PlusWhite illuminant PlusWhite

TL84 illuminant TL84

Polylux3000 illuminant Polylux3000

Polylux4000 illuminant Polylux4000

KolorRite illuminant KolorRite

FL1 illuminant FL1

FL2 illuminant FL2

FL3 illuminant FL3

FL4 illuminant FL4

FL5 illuminant FL5

FL6 illuminant FL6

FL7 illuminant FL7

FL8 illuminant FL8
FL9 illuminant FL9
FL10 illuminant FL10
FL11 illuminant FL11
FL12 illuminant FL12

Author(s)

Jose Gama

Source

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

References

Wyszecki, G., & Stiles, W. S., 1982 Color Science: concepts and methods, quantitative data and formulae (2nd ed.). New York: Wiley.

Examples

```
data(illuminants)  
illuminants
```

ISObrightnessReflectometerRSD

Weighting factors for the calculation of ISO brightness

Description

ISObrightnessReflectometerRSD is a table with the weighting factors for the calculation of ISO brightness.

Usage

```
ISObrightnessReflectometerRSD
```

Format

This data frame contains the following data:

wln wavelength
F factor
weights weight

Author(s)

Jose Gama

Source

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

References

Scandinavian Pulp, paper and board, 2003 Basic equations for optical properties SCAN-G 5:03 Revised 2003

Examples

```
data(ISObrightnessReflectometerRSD)
ISObrightnessReflectometerRSD
```

kelvin2xy	<i>Blackbody radiator color temperature to CIE 1931 x,y chromaticity approximation function</i>
-----------	---

Description

kelvin2xy Blackbody radiator color temperature to CIE 1931 x,y chromaticity approximation function.

Usage

```
kelvin2xy(T)
```

Arguments

T temperature in Kelvin

Value

color temperature

Author(s)

Jose Gama

Source

Kim et al., 2002 "Design of Advanced Color - Temperature Control System for HDTV Applications" <https://www.jkps.or.kr/journal/view.html?uid=5163&vmd=Full>

References

Kim et al., 2002 "Design of Advanced Color - Temperature Control System for HDTV Applications" <https://www.jkps.or.kr/journal/view.html?uid=5163&vmd=Full>

Examples

```
kelvin2xy(300)
```

Lab2LCHab

Convert CIE Lab coordinates to LCHab

Description

Lab2LCHab Converts CIE Lab coordinates to LCHab.

Usage

```
Lab2LCHab(LabMatrix)
```

Arguments

LabMatrix CIE Lab coordinates

Value

LCHab coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
Lab2LCHab(c(0.310897, 0.306510, 74.613450))
```

LAB2LUV*Convert CIE Lab coordinates to CIE Luv*

Description

LAB2LUV Converts CIE Lab coordinates to CIE Luv.

Usage

```
LAB2LUV(Labmatrix)
```

Arguments

Labmatrix CIE Lab coordinates

Value

XYZ coordinates

Author(s)

Jose Gama

Examples

```
LAB2LUV(c(0.310897, 0.306510, 74.613450))
```

Lab2XYZ*Convert CIE Lab coordinates to XYZ*

Description

Lab2XYZ Converts CIE Lab coordinates to XYZ.

Usage

```
Lab2XYZ(Labmatrix, illuminant = "D65", observer = 2, RefWhite  
        = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

Labmatrix CIE Lab coordinates
illuminant illuminant
observer observer
RefWhite Reference White

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

Lab2XYZ(c(0.310897, 0.306510, 74.613450))

LCHab2Lab

Convert LCHab coordinates to CIE Lab

Description

LCHab2Lab Converts LCHab coordinates to CIE Lab.

Usage

LCHab2Lab(LCHabmatrix)

Arguments

LCHabmatrix LCHab coordinates

Value

CIE Lab coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
LCHab2Lab(c(0.310897, 0.306510, 74.613450))
```

LCHuv2Luv

Convert LCHuv coordinates to CIE Luv

Description

LCHuv2Luv Converts LCHuv coordinates to CIE Luv.

Usage

```
LCHuv2Luv(LCHuvmatrix)
```

Arguments

LCHuvmatrix LCHuv coordinates

Value

CIE Luv coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
LCHuv2Luv(c(0.310897, 0.306510, 74.613450))
```

LEF2RGB

Convert LEF coordinates to RGB

Description

LEF2RGB Converts LEF coordinates to RGB.

Usage

LEF2RGB(LEFmatrix)

Arguments

LEFmatrix LEF coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

References

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

Examples

```
LEF<-c(176.66667, 53.50000, -12.99038)
LEF2RGB(LEF)
```

`LMS2DKL`*Convert LMS coordinates to DKL*

Description

LMS2DKL Converts LMS coordinates to DKL.

Usage

```
LMS2DKL(bg, diffcone.coords, DKL2LMS = FALSE)
```

Arguments

<code>bg</code>	LMS coordinates
<code>diffcone.coords</code>	LMS coordinates
<code>DKL2LMS</code>	boolean, FALSE = DKL to LMS, TRUE = LMS to DKL

Value

DKL coordinates

Author(s)

Jose Gama

Source

David H. Brainard Cone Contrast and Opponent Modulation Color Spaces pp. 563 PART IV: CONE CONTRAST AND OPPONENT MODULATION COLOR SPACES

References

David H. Brainard Cone Contrast and Opponent Modulation Color Spaces pp. 563 PART IV: CONE CONTRAST AND OPPONENT MODULATION COLOR SPACES

Examples

```
#LMS<-c(3.822394, 10.17498, 1.130049)
#LMS2DKL(LMS)
```

LMS2RGB

Convert LMS coordinates to RGB

Description

LMS2RGB Converts LMS coordinates to RGB.

Usage

LMS2RGB(LMSmatrix)

Arguments

LMSmatrix LMS coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
LMS<-c(3.822394, 10.17498, 1.130049)
LMS2RGB(LMS)
```

LMS2XYZ

Convert LMS coordinates to XYZ

Description

LMS2XYZ Converts LMS coordinates to XYZ.

Usage

LMS2XYZ(LMSmatrix)

Arguments

LMSmatrix LMS coordinates

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
LMS<-c(3.822394, 10.17498, 1.130049)
LMS2XYZ(LMS)
```

LSLM2RGB

Convert LSLM coordinates to RGB

Description

LSLM2RGB Converts LSLM coordinates to RGB.

Usage

LSLM2RGB(LSLMmatrix)

Arguments

LSLMmatrix LSLM coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
LSLM<-c(-0.4186083, 0.007563981, 0.4918533)
LSLM2RGB(LSLM)
```

LUV2LAB	<i>Convert CIE Luv coordinates to CIE Lab</i>
---------	---

Description

LUV2LAB Converts CIE Luv coordinates to CIE Lab.

Usage

LUV2LAB(Luvmatrix)

Arguments

Luvmatrix Luv matrix

Value

XYZ coordinates

Author(s)

Jose Gama

Examples

LUV2LAB(c(0.310897, 0.306510, 74.613450))

Luv2LCHuv	<i>Convert CIE Luv coordinates to LCHuv</i>
-----------	---

Description

Luv2LCHuv Converts CIE Luv coordinates to LCHuv.

Usage

Luv2LCHuv(LuvMatrix)

Arguments

LuvMatrix Luv coordinates

Value

LCHuv coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
Luv2LCHuv(c(0.310897, 0.306510, 74.613450))
```

Luv2XYZ

Convert CIE Luv coordinates to XYZ

Description

Luv2XYZ Converts CIE Luv coordinates to XYZ.

Usage

```
Luv2XYZ(Luvmatrix, illuminant = "D65", observer = 2, RefWhite  
        = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

Luvmatrix	Luv matrix
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
Luv2XYZ(c(0.310897, 0.306510, 74.613450))
```

Luv2Yuv

Convert CIE Luv coordinates to Yuv

Description

Luv2Yuv Converts CIE Luv coordinates to Yuv.

Usage

```
Luv2Yuv(Luvmatrix, illuminant='D65', observer=2, RefWhite=
get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

Luvmatrix	CIE Luv coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

Yuv coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
Luv2Yuv(c(0.310897, 0.306510, 74.613450))
```

makeChromaticAdaptationMatrix
Generate a Chromatic Adaptation matrix

Description

makeChromaticAdaptationMatrix Generates a Chromatic Adaptation matrix.

Usage

```
makeChromaticAdaptationMatrix(ChromaticAdaptationAlgorithm = "VonKries",  
                               illuminantSource = "C", illuminantDestination = "D65",  
                               observer = 2, ChromaticAdaptationArray =  
                               get("ChromaticAdaptation", envir = environment()),  
                               referenceWhiteArray = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

ChromaticAdaptationAlgorithm	Chromatic adaptation algorithm
illuminantSource	illuminant source
illuminantDestination	illuminant destination
observer	observer
ChromaticAdaptationArray	Chromatic adaptation array
referenceWhiteArray	reference white

Value

Chromatic Adaptation matrix

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

MaterialReferenceData *Material Reference Data from Principles of Digital Image Synthesis*

Description

MaterialReferenceData Material Reference Data from Principles of Digital Image Synthesis, Appendix G Andrew S. Glassner 16 August 1994.

Usage

MaterialReferenceData

Format

This data frame contains the following data:

wavelength wavelength (nm)
DarkSkin spectra of: dark skin
LightSkin spectra of: light skin
BlueSky spectra of: blue sky
Foliage spectra of: foliage
BlueFlower spectra of: blue flower
BluishGreen spectra of: bluish green
Orange spectra of: orange
PurplishBlue spectra of: purplish blue
ModerateRed spectra of: moderate red
Purple spectra of: purple
YellowGreen spectra of: yellow green
OrangeYellow spectra of: orange yellow
Blue spectra of: blue
Green spectra of: green
Red spectra of: red
Yellow spectra of: yellow
Magenta spectra of: magenta
Cyan spectra of: cyan
White spectra of: white
Neutral spectra of: neutral
Neutral6.5 spectra of: neutral 6.5
Neutral5 spectra of: neutral 5
Neutral3.5 spectra of: neutral 3.5

Black spectra of: black
PineNeedles spectra of: pine needles
SilverMapleLeaf spectra of: silver maple leaf
DarkGreenMapleLeaf spectra of: dark green maple leaf
RedMapleLeaf spectra of: red maple leaf
Grass spectra of: grass
Soil spectra of: soil
VineLeaf spectra of: vine leaf
Alphalt spectra of: alphalt
DaisyWhitePetals spectra of: daisy white petals
DaisyYellowCenter spectra of: daisy yellow center
MarigoldOrange spectra of: marigold orange
MarigoldYellow spectra of: marigold yellow
DarkBlueJeans spectra of: dark blue jeans
FadedJeans spectra of: faded jeans
DarkBlueSweatPants spectra of: dark blue sweat pants
Denim spectra of: denim
WheatBread spectra of: wheat bread
WheatBreadCrust spectra of: wheat bread crust
Pancake spectra of: pancake
SwissArmyKnife spectra of: swiss army knife
PineWood spectra of: pine wood
MapleWood spectra of: maple wood
OakWood spectra of: oak wood
Bamboo spectra of: bamboo
Redwood spectra of: redwood
WalnutWood spectra of: walnut wood
YellowBanana spectra of: yellow banana
RipeBrownBanana spectra of: ripe brown banana
Cucumber spectra of: cucumber
CornKernel spectra of: corn kernel
CornHusk spectra of: corn husk
YellowDeliciousApple spectra of: yellow delicious apple
GreenPepper spectra of: green pepper
LemonSkin spectra of: lemon skin
Lettuce spectra of: lettuce
Carrot spectra of: carrot
BarleySeeds spectra of: barley seeds
LentilSeeds spectra of: lentil seeds
BrownRiceSeeds spectra of: brown rice seeds
Sand spectra of: sand

Author(s)

Jose Gama

Source

Andrew S. Glassner, 1995 Principles of Digital Image Synthesis The Morgan Kaufmann Series in Computer Graphics and Geometric Modeling

References

Andrew S. Glassner, 1995 Principles of Digital Image Synthesis The Morgan Kaufmann Series in Computer Graphics and Geometric Modeling

Examples

```
data(MaterialReferenceData)  
str(MaterialReferenceData)
```

MaxChromaFromExtrapRenotationData

Table with maximum chroma for which extrapolated renotation data is available

Description

MaxChromaFromExtrapRenotationData table with maximum chroma for which extrapolated renotation data is available.

Usage

```
MaxChromaFromExtrapRenotationData
```

Format

This data frame contains the following columns:

H Hue

V Value

MaximumChroma Maximum Chroma

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MaxChromaFromExtrapRenotationData)
MaxChromaFromExtrapRenotationData
```

MaxChromasForStandardMunsellHuesAndValues

Table with maximum Munsell chroma, for a given Munsell hue and value, for which an extrapolated renotation value is available

Description

MaxChromasForStandardMunsellHuesAndValues table with maximum Munsell chroma, for a given Munsell hue and value, for which an extrapolated renotation value is available.

Usage

```
MaxChromasForStandardMunsellHuesAndValues
```

Format

This data frame contains the following columns:

H Hue

V Value

MaximumChroma Maximum Chroma (MacAdam limit)

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MaxChromasForStandardMunsellHuesAndValues)
MaxChromasForStandardMunsellHuesAndValues
```

<code>Maxwell.triangle</code>	<i>Plot the Maxwell triangle</i>
-------------------------------	----------------------------------

Description

`Maxwell.triangle` Plots the Maxwell triangle, as a black line, a color line or a polygon.

Usage

```
Maxwell.triangle(primariesRGB=get("whitepointsRGB", envir = environment()),
conversionFunction=NULL,...)
```

Arguments

<code>primariesRGB</code>	primarie valuess for RGB color spaces
<code>conversionFunction</code>	optional function to perform the coordinate conversion
<code>...</code>	optional parameters for the plot command

Value

none

Author(s)

Jose Gama

Examples

```
Maxwell.triangle()
xl<-yl<-0:1
Maxwell.triangle(xlim=xl,ylim=yl)
Maxwell.triangle(conversionFunction=CIE1931XYZ2CIE1976uv,
xlim=xl,ylim=yl,xlab="u'",ylab="v'")
```

Munsell100hues55

Chromaticity diagram showing values for x and y for Illuminant A for 100 hues at 5/5

Description

Munsell100hues55 Chromaticity diagram showing Tristimulus Values and Trilinear Coordinates for Illuminant A for 100 hues at 5/5.

Usage

Munsell100hues55

Format

This data frame contains the following columns:

BookNotation Munsell color notation from the Munsell book

MunsellProductionNo

X Tristimulus Value X

Y Tristimulus Value Y

Z Tristimulus Value Z

x Trilinear Coordinate x

y Trilinear Coordinate y

z Trilinear Coordinate z

Author(s)

Jose Gama

Source

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

References

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

Examples

```
data(Munsell1100hues55)
Munsell1100hues55
```

Munsell1100hues55FM100 *Munsell 100-Hues at 5/5, production numbers 101 to 200 and Farnsworth-Munsell 100 Hue test*

Description

Munsell1100hues55FM100 Munsell 100-Hues at 5/5, production numbers 101 to 200 and Farnsworth-Munsell 100 Hue test.

Usage

```
Munsell1100hues55FM100
```

Format

This data frame contains the following columns:

FMtest Farnsworth-Munsell 100 Hue test value

MunsellNumber Munsell 100-Hues at 5/5, production number

Author(s)

Jose Gama

Source

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

References

Hermann VON Schelling, Dean Farnsworth, 1949 Trichromatic Specifications of the Munsell 100 Hues at 5/5 for Illuminant a Defense Technical Information Center NAVAL MEDICAL RESEARCH LAB NEW LONDON CONN.

Examples

```
data(Munsell100hues55FM100)
Munsell100hues55FM100
```

MunsellHues	<i>Table with Munsell Hues</i>
-------------	--------------------------------

Description

MunsellHues table with Munsell Hues.

Usage

MunsellHues

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MunsellHues)
MunsellHues
```

MunsellNeutrals2sRGB *Table with Munsell Neutrals and corresponding sRGB*

Description

MunsellNeutrals2sRGB table with Munsell Neutrals and corresponding sRGB.

Usage

MunsellNeutrals2sRGB

Format

This data frame contains the following columns:

MunsellNeutral Munsell N

R sRGB R

G sRGB G

B sRGB B

Author(s)

Jose Gama

Source

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

References

Paul Centore 2014 The Munsell and Kubelka-Munk Toolbox <https://www.munsellcolourscienceforpainters.com/MunsellAndKubelkaMunkToolbox/MunsellAndKubelkaMunkToolbox.html>

James D. Foley, Andries van Dam, Steven K. Feiner, & John F. Hughes, 1990 Computer Graphics: Principles and Practice, 2nd ed., Addison-Wesley Publishing Company.

Gunter Wyszecki & W. S. Stiles, 1982 Color Science: Concepts and Methods, Quantitative Data and Formulae, 2nd edition, John Wiley and Sons

Examples

```
data(MunsellNeutrals2sRGB)
MunsellNeutrals2sRGB
```


References

Spectral Color Research group, 1989 University of Kuopio, Finland School of Computing and the Department of Physics and Mathematics Database - Munsell Colors Matt (AOTF) <https://sites.uef.fi/spectral/databases-software/munsell-colors-matt-aotf-measured/>

Parkkinen, J. P. S., Hallikainen, J. and Jaaskelainen, 1989 "Characteristic spectra of Munsell colors," Journal of the Optical Society of America Vol. 6, No. 2, February 1989, pp. 318-322.

Examples

```
## Not run:  
data(MunsellSpectral)  
MunsellSpectral  
  
## End(Not run)
```

MunsellV2relativeLuminanceY

Munsell value V to relative luminance Y

Description

MunsellV2relativeLuminanceY Munsell value V to relative luminance Y.

Usage

```
MunsellV2relativeLuminanceY(V)
```

Arguments

V Munsell value

Value

CIE XYZ "Y"

Author(s)

Jose Gama

Source

Mark D. Fairchild, 2013 Color Appearance Models, 3rd Ed. Wiley-IS&T

References

Mark D. Fairchild, 2013 Color Appearance Models, 3rd Ed. Wiley-IS&T

Examples

MunsellV2relativeLuminanceY(5)

MunsellV2Y

Munsell value to CIE XYZ "Y"

Description

MunsellV2Y Munsell value to CIE XYZ "Y" .

Usage

MunsellV2Y(V)

Arguments

V Munsell value

Value

CIE XYZ "Y"

Author(s)

Jose Gama

Source

ASTM, 2008 ASTM Standard D1535-08

References

ASTM, 2008 ASTM Standard D1535-08

Examples

MunsellV2Y(5)

NickersonColorDifference

Nickerson Color Difference

Description

NickersonColorDifference Nickerson's Color Difference.

Usage

NickersonColorDifference(MunsellHVC1, MunsellHVC2)

Arguments

MunsellHVC1 Munsell HVC 1

MunsellHVC2 Munsell HVC 2

Value

Delta E

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

References

Bruce Justin Lindbloom, 2013 Color Calculator <http://www.brucelindbloom.com>

Examples

NickersonColorDifference('10B 5/6', '5B 5/4')

PhotoYCC2RGB

Convert PhotoYCC to RGB

Description

PhotoYCC2RGB Converts PhotoYCC to RGB.

Usage

PhotoYCC2RGB(PhotoYCCmatrix)

Arguments

PhotoYCCmatrix PhotoYCC coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
p <- c(0.4560569, 155.9415709, 137.3026467)
PhotoYCC2RGB(p)
```

PreucilAngle	<i>Preucil Angle</i>
--------------	----------------------

Description

PreucilAngle Preucil Angle.

Usage

PreucilAngle(RGBmatrix)

Arguments

RGBmatrix RGB coordinates

Value

Angle

Author(s)

Jose Gama

Source

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

References

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

Examples

PreucilAngle(c(24,72,44))

PreucilPercentGreyness	<i>Preucil Percentage of Greyness</i>
------------------------	---------------------------------------

Description

PreucilPercentGreyness Preucil Percentage of Greyness.

Usage

PreucilPercentGreyness(RGBmatrix)

Arguments

RGBmatrix RGB coordinates

Value

Percentage of Greyness

Author(s)

Jose Gama

Source

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

References

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

Examples

```
PreucilPercentGreyness(c(24, 72, 44))
```

PreucilPercentHueError

Preucil Percentage of Greyness

Description

PreucilPercentHueError Preucil Percentage of Hue Error.

Usage

```
PreucilPercentHueError(RGBmatrix)
```

Arguments

RGBmatrix RGB coordinates

Value

Percentage of HueError

Author(s)

Jose Gama

Source

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

References

Robert William Gainer Hunt, 1987 The Reproduction of Colour Fountain Press Edition 4, illustrated

Examples

```
PreucilPercentHueError(c(24,72,44))
```

RGB2CMY

Convert sRGB coordinates to CMY

Description

RGB2CMY Converts sRGB coordinates to CMY.

Usage

```
RGB2CMY(GBmatrix)
```

Arguments

GBmatrix sRGB coordinates

Value

CMY coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
RGB2CMY(c(0.310897, 0.306510, 74.613450))
```

rgb2dklV *convert RGB to DKL*

Description

rgb2dklV Converts sRGB coordinates to DKL, spherical coords, same as Graph-Based Visual Saliency. rgb2dklCart Converts sRGB coordinates to DKL, cartesian coords.

Usage

rgb2dklV(RGB)

Arguments

RGB sRGB coordinates

Value

DKL coordinates

Author(s)

Jose Gama

Source

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

References

Package psychopy for Python

Graph-Based Visual Saliency (MATLAB source code) Jonathan Harel California Institute of Technology

Examples

rgb2dklCart(c(54, 75, 121))

RGB2HSL

Convert RGB coordinates to HSL

Description

RGB2HSL Converts RGB coordinates to HSL.

Usage

RGB2HSL(RGBmatrix)

Arguments

RGBmatrix RGB coordinates

Value

HSL coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
RGB<-c(124,63,78)
RGB2HSL(RGB)
```

RGB2HSV

Convert RGB coordinates to HSV

Description

RGB2HSV Converts RGB coordinates to HSV.

Usage

```
RGB2HSV(GBmatrix)
```

Arguments

GBmatrix RGB coordinates

Value

HSV coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
RGB<-c(124,63,78)
RGB2HSV(RGB)
```

RGB2hue	<i>Convert sRGB coordinates to hue</i>
---------	--

Description

RGB2hue Converts sRGB coordinates to hue.

Usage

```
RGB2hue(GBmatrix)
```

Arguments

GBmatrix	sRGB coordinates
----------	------------------

Value

hue

Author(s)

Jose Gama

Examples

```
RGB2hue(c(0.310897, 0.306510, 74.613450))
```

RGB2LEF	<i>Convert RGB coordinates to LEF</i>
---------	---------------------------------------

Description

RGB2LEF Converts RGB coordinates to LEF.

Usage

```
RGB2LEF(GBmatrix)
```

Arguments

GBmatrix	RGB coordinates
----------	-----------------

Value

LEF coordinates

Author(s)

Jose Gama

Source

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

References

Kang, Henry R, 2006 Computational color technology Spie Press Bellingham

Examples

```
RGB<-c(124,63,78)
RGB2LEF(RGB)
```

RGB2LMS

Convert RGB coordinates to LMS

Description

RGB2LMS Converts RGB coordinates to LMS.

Usage

```
RGB2LMS(RGBmatrix)
```

Arguments

RGBmatrix RGB coordinates

Value

LMS coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
RGB<-c(124,63,78)
RGB2LSM(RGB)
```

RGB2LSLM

Convert RGB coordinates to LSLM

Description

RGB2LSLM Converts RGB coordinates to LSLM.

Usage

```
RGB2LSLM(RGBmatrix)
```

Arguments

RGBmatrix RGB coordinates

Value

LSLM coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
RGB<-c(124,63,78)
RGB2LSLM(RGB)
```

RGB2PhotoYCC

Convert RGB coordinates to PhotoYCC

Description

RGB2PhotoYCC Converts RGB coordinates to PhotoYCC.

Usage

RGB2PhotoYCC(RGBmatrix)

Arguments

RGBmatrix RGB coordinates

Value

PhotoYCC coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2PhotoYCC(RGB)
```

 RGB2XYZ

 Convert sRGB coordinates to XYZ

Description

RGB2XYZ Converts sRGB coordinates to XYZ.

Usage

```
RGB2XYZ(GBmatrix, illuminant = "D65", observer = 2, RefWhite
        = get("XYZperfectreflectingdiffuser", envir = environment()),
        RGBModel = "sRGB", RefWhiteRGB = get("whitepointsRGB",
        envir =environment()), gamma = NA,
        RefWhiteIllum = get("XYZperfectreflectingdiffuser",
        envir = environment()), CAT = "Bradford",
        CATarray = get("ChromaticAdaptation", envir = environment()))
```

Arguments

GBmatrix	sRGB coordinates
illuminant	illuminant
observer	observer
RefWhite	White Reference
RGBModel	RGB Model
RefWhiteRGB	White Reference RGB
gamma	gamma
RefWhiteIllum	White Reference illuminant
CAT	Chromatic Adaptation algorithm
CATarray	Chromatic Adaptation data

Value

CIE XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
RGB2XYZ(c(0.310897, 0.306510, 74.613450))
```

RGB2YCbCr

Convert RGB coordinates to YCbCr

Description

RGB2YCbCr Converts RGB coordinates to YCbCr.

Usage

```
RGB2YCbCr(RGBmatrix)
```

Arguments

RGBmatrix RGB coordinates

Value

YCbCr coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2YCbCr(RGB)
```

`RGB2YIQ`*Convert RGB coordinates to YIQ*

Description

RGB2YIQ Converts RGB coordinates to YIQ.

Usage

```
RGB2YIQ(RGBmatrix)
```

Arguments

RGBmatrix RGB coordinates

Value

YIQ coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2YIQ(RGB)
```

RGB2YPbPr

Convert RGB coordinates to YPbPr

Description

RGB2YPbPr Converts RGB coordinates to YPbPr.

Usage

RGB2YPbPr(GBmatrix)

Arguments

GBmatrix RGB coordinates

Value

YPbPr coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
RGB<-c(124,63,78)
RGB2YPbPr(RGB)
```

RGB2YUV	<i>Convert RGB coordinates to YUV</i>
---------	---------------------------------------

Description

RGB2YUV Converts RGB coordinates to YUV.

Usage

```
RGB2YUV(RGBmatrix)
```

Arguments

RGBmatrix	RGB coordinates
-----------	-----------------

Value

YUV coordinates

Author(s)

Jose Gama

Examples

```
RGB<-c(124,63,78)
RGB2YUV(RGB)
```

RxRyRz2XYZ	<i>convert from three filter measurements (reflectance factors) to XYZ</i>
------------	--

Description

RxRyRz2XYZ convert from three filter measurements (reflectance factors) to XYZ.

Usage

```
RxRyRz2XYZ(RxRyRzmatrix=NA,illuminant='C', observer=2,
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

RxRyRzmatrix	reflectance factors coordinates
illuminant	illuminant
observer	observer
RefWhite	White Reference

Value

CIE XYZ coordinates

Author(s)

Jose Gama

Examples

RxRyRz2XYZ(c(7.90393, 8.391198, 9.721126))

saturationCIECAM02 *saturation CIECAM 2002*

Description

saturationCIECAM02 saturation CIECAM 2002.

Usage

saturationCIECAM02(M, Q)

Arguments

M	colorfulness
Q	brightness

Value

saturation

Author(s)

Jose Gama

Source

Color by Wikipedians <http://www.easyrgb.com/>

References

Color by Wikipedians <http://www.easyrgb.com/>

saturationCIELABEvaLubbe

CIELAB saturation (Eva Lubbe)

Description

saturationCIELABEvaLubbe CIELAB saturation (chroma normalized by lightness).

Usage

saturationCIELABEvaLubbe(L, a, b)

Arguments

L	CIELAB L
a	CIELAB a
b	CIELAB b

Value

saturation

Author(s)

Jose Gama

Source

Color by Wikipedians <http://www.easyrgb.com/>

References

Color by Wikipedians <http://www.easyrgb.com/>

Examples

saturationCIELABEvaLubbe(34.78467, 28.15159, 3.024663)

saturationCIELUV *CIELUV/CIELAB saturation*

Description

saturationCIELUV CIELUV/CIELAB saturation.

Usage

saturationCIELUV(u, v, un, vn)

Arguments

u	CIELAB u
v	CIELAB v
un	CIELAB u neutral
vn	CIELAB v neutral

Value

saturation

Author(s)

Jose Gama

Source

Color by Wikipedians <http://www.easyrgb.com/>

References

Color by Wikipedians <http://www.easyrgb.com/>

SmithPokorny2degConeFundamentals1975

Smith & Pokorny (1975) 2-deg cone fundamentals

Description

SmithPokorny2degConeFundamentals1975 Smith & Pokorny (1975) 2-deg cone fundamentals based on the CIE Judd-Vos 2-deg CMFs.

Usage

SmithPokorny2degConeFundamentals1975

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(SmithPokorny2degConeFundamentals1975)
SmithPokorny2degConeFundamentals1975
```

spectra2CCT

Correlated Color Temperature (CCT) from spectra

Description

spectra2CCT Correlated Color Temperature (CCT) from spectra.

Usage

```
spectra2CCT(SPD=NA, isoTempLinesTable=NA,
CIETable = get("ciexyz31", envir = environment()), TCS = get("TCSdata",
envir = environment()))
```

Arguments

SPD light source spd

isoTempLinesTable

Iso temperature lines table

CIETable reference data values

TCS spectral reflectance data of 14 color test samples for CRI

Value

Correlated Color Temperature (CCT)

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf>

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf>

Examples

```
# illuminant A
SPD = illuminants[1:51*2-1,c('wlnm','A')] # every 10 nm
CCT <- spectra2CCT(SPD)
CCT
```

spectra2CRIGAI FSCI *CRI, GAI and FSCI from spectra*

Description

spectra2CRIGAI FSCI Color Rendering Index (CRI), Gamut Area Index (GAI) and full spectrum index (FSCI) from spectra.

Usage

```
spectra2CRIGAI FSCI(SPD=NA, isoTempLinesTable=NA, CCT=NA,
CIETable = get("ciexyz31", envir = environment()), TCS = get("TCSdata",
envir = environment()))
```

Arguments

SPD	light source spd
isoTempLinesTable	Iso temperature lines table
CCT	Correlated Color Temperature (CCT)
CIETable	reference data values
TCS	spectral reflectance data of 14 color test samples for CRI

Value

CRI, GAI and FSCI

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf>

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf>

Examples

```
# illuminant A
## Not run:
SPD = illuminants[1:51*2-1,c('wlnm','A')] # every 10 nm
isoTempLinesTable <- createIsoTempLinesTable(SPD)
CCT <- spectra2CCT(SPD)
spectra2CRIGAIIFSCI(SPD, isoTempLinesTable, CCT)
spectra2CRIGAIIFSCI(SPD, isoTempLinesTable)
spectra2CRIGAIIFSCI(SPD)

## End(Not run)
```

spectra2ISObrightness *Diffuse blue reflectance factor (ISO brightness)*

Description

spectra2ISObrightness Diffuse blue reflectance factor (ISO brightness), R457, ISO 2470.

Usage

```
spectra2ISObrightness(spectraIn=NA, wlnIn=NA,
RSDmatrix=get("ISObrightnessReflectometerRSD", envir = environment()))
```

Arguments

spectraIn	spectral data
wlnIn	wavelength range
RSDmatrix	ISO brightness data

Value

LCHuv coordinates

Author(s)

Jose Gama

Source

ISO board, 2009 ISO 2470-1 : 2009 PAPER, BOARD AND PULPS MEASUREMENT OF DIFFUSE BLUE REFLECTANCE FACTOR PART 1 INDOOR DAYLIGHT CONDITIONS (ISO BRIGHTNESS)

References

ISO board, 2009 ISO 2470-1 : 2009 PAPER, BOARD AND PULPS MEASUREMENT OF DIFFUSE BLUE REFLECTANCE FACTOR PART 1 INDOOR DAYLIGHT CONDITIONS (ISO BRIGHTNESS)

Examples

```
spectra2ISObrightness(MaterialReferenceData[,c('BlueSky')],
MaterialReferenceData[,c('wavelength' )])
```

spectra2lux	<i>Illuminance (Lux) from spectra</i>
-------------	---------------------------------------

Description

spectra2lux Illuminance (Lux) from spectra.

Usage

```
spectra2lux(spectraIn=NA, cixyzIn=NA,wlIn=NA, wlInterval=NA)
```

Arguments

spectraIn	light source spd
cixyzIn	reference data values
wlIn	range of output wavelengths
wlInterval	arbitrary wavelength interval to be applied to all series through interpolation

Value

Correlated Color Temperature (CCT)

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf>

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf>

Examples

```
spectra2lux(MaterialReferenceData[,c('wavelength','BlueSky')])
```

 spectra2XYZ

convert spectral data to tristimulus values

Description

spectra2XYZ convert spectral data to tristimulus values.

Usage

```
spectra2XYZ(spectraIn=NA, illuminantIn=NA, cixyzIn=NA,wlIn=NA, wlInterval=NA)
```

Arguments

spectraIn	spectral data
illuminantIn	illuminant
cixyzIn	range of illuminant wavelengths
wlIn	range of spectral wavelengths
wlInterval	arbitrary wavelength interval to be applied to all series through interpolation

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Andrew S. Glassner, 1995 Principles of digital image synthesis: Vol. 1 Kaufmann

References

Andrew S. Glassner, 1995 Principles of digital image synthesis: Vol. 1 Kaufmann

Examples

```
spectra2XYZ(MaterialReferenceData[,c('wavelength', 'BlueSky')])
```

sprague

Interpolates an n by w matrix of spectra, sprague

Description

sprague Interpolates an n by w matrix of spectra, sprague.

Usage

```
sprague(spectra, f)
```

Arguments

spectra	spectral data
f	range of wavelengths

Value

Interpolated spectral data

Author(s)

Jose Gama

Source

Stephen Westland, 2014 <http://www.mathworks.com/matlabcentral/fileexchange/40640-computational-colour-content/sprague.m>

References

Stephen Westland, 2014 <http://www.mathworks.com/matlabcentral/fileexchange/40640-computational-colour-content/sprague.m>

StearnsStearnsCorrection
Stearns and Stearns correction

Description

StearnsStearnsCorrection Stearns and Stearns correction.

Usage

StearnsStearnsCorrection(P)

Arguments

P XYZ coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Stephen Westland and Caterina Ripamonti, 2004 Computational Colour Science using MATLAB
John Wiley & Sons Ltd, pp.35

References

Stephen Westland and Caterina Ripamonti, 2004 Computational Colour Science using MATLAB
John Wiley & Sons Ltd, pp.35

Stensby68.Whiteness *Stensby Whiteness*

Description

Stensby68.Whiteness formula was developed by Mr. P. Stensby (formerly employee of J.R. Geigy AG in US.)

Usage

Stensby68.Whiteness(LabHunterMatrix)

Arguments

LabHunterMatrix
 Lab Hunter values for illuminant C

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

Stensby68.Whiteness(c(0.310897, 0.306510, 74.613450))

StockmanMacLeodJohnson10degConeFundamentals1993

Stockman & Sharpe (2000) 10-deg cone fundamentals

Description

StockmanMacLeodJohnson10degConeFundamentals1993 Stockman, MacLeod & Johnson (1993) 2-deg cone fundamentals based on the CIE 10-deg CMFs (adjusted to 2-deg).

Usage

StockmanMacLeodJohnson10degConeFundamentals1993

Format

This data frame contains the following data:

wlnm wavelength (nm)

L10 L-cone spectral sensitivity, L10(lambda)

M10 M-cone spectral sensitivity, M10(lambda)

S10 S-cone spectral sensitivity, S10(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanMacLeodJohnson10degConeFundamentals1993)
StockmanMacLeodJohnson10degConeFundamentals1993
```

StockmanMacLeodJohnson2degCIEadjConeFundamentals1993
Stockman, MacLeod & Johnson (1993) 2-deg cone fundamentals

Description

StockmanMacLeodJohnson2degCIEadjConeFundamentals1993 Stockman, MacLeod & Johnson (1993) 2-deg cone fundamentals based on the CIE 10-deg CMFs (adjusted to 2-deg).

Usage

```
StockmanMacLeodJohnson2degCIEadjConeFundamentals1993
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanMacLeodJohnson2degCIEadjConeFundamentals1993)
StockmanMacLeodJohnson2degCIEadjConeFundamentals1993
```

StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993
Stockman, MacLeod & Johnson (1993) 2-deg fundamentals

Description

StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993 Stockman, MacLeod & Johnson (1993) 2-deg fundamentals based on the Stiles & Burch 2-deg CMFs.

Usage

```
StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993
```

Format

This data frame contains the following data:

wlnm wavelength (nm)
L2 L-cone spectral sensitivity, L2(lambda)
M2 M-cone spectral sensitivity, M2(lambda)
S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993)
StockmanMacLeodJohnson2degStilesBurchConeFundamentals1993
```

StockmanSharpe10degCMFS2000

Stockman & Sharpe (2000) 10-deg cone fundamentals

Description

StockmanSharpe10degCMFS2000 Stockman & Sharpe (2000) 10-deg cone fundamentals based on the Stiles & Burch 10-deg CMFs linear 5nm.

Usage

StockmanSharpe10degCMFS2000

Format

This data frame contains the following data:

wlnm wavelength (nm)

L10 L-cone spectral sensitivity, L10(lambda)

M10 M-cone spectral sensitivity, M10(lambda)

S10 S-cone spectral sensitivity, S10(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanSharpe10degCMFS2000)
StockmanSharpe10degCMFS2000
```

StockmanSharpe2degCMFadj2000

Stockman & Sharpe (2000) 2-deg cone fundamentals

Description

StockmanSharpe2degCMFadj2000 Stockman & Sharpe (2000) 2-deg cone fundamentals based on the Stiles & Burch 10-deg CMFs (adjusted to 2-deg) linear 5nm.

Usage

StockmanSharpe2degCMFadj2000

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(StockmanSharpe2degCMFadj2000)
StockmanSharpe2degCMFadj2000
```

SystemISCCNBS

ISCC-NBS System

Description

SystemISCCNBS is a table with the ISCC-NBS System data.

Usage

SystemISCCNBS

Format

This data frame contains the following data:

HueInterval interval of hues in the hue chart defining the elementary block

Hmin minimum ASTM D1535 Hue for the elementary block

Hmax maximum ASTM D1535 Hue for the elementary block

Vmin minimum Value for the elementary block

Vmax maximum Value for the elementary block

Cmin minimum Chroma for the elementary block

Cmax maximum Chroma for the elementary block. Cmax=Inf for some elementary blocks.

Number color number of the elementary block, from 1 to 267

Author(s)

Glenn Davis

References

Color : Universal Language and Dictionary of Names ISCC-NBS Method of Designating Colors and a Dictionary of Color Names Kelly, Kenneth Low Judd, Deane Brewster NBS Special Publication 440 December 1976 Section 13: Color Name Charts, pp. 16-31

Examples

```
data(SystemISCCNBS)
SystemISCCNBS
```

Taube60.Whiteness *Taube Whiteness*

Description

Taube60.Whiteness developed by Mr. Taube (formerly an employee of BASF AG, Germany). It was presented in 1960 and has found its application mainly in the plastic sector.

Usage

```
Taube60.Whiteness(XYZmatrix, illuminant = "D65", observer = 2, RefWhite  
                  = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	CIE tristimulus values for illuminant C
illuminant	illuminant
observer	observer
RefWhite	White reference

Author(s)

Jose Gama

Source

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

References

Xrite, 2012 Color iQC and Color iMatch Color Calculations Guide Version 8.0 30 July 2012 Revision 1.0

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)  
Taube60.Whiteness(XYZ)
```

TCSdata

The spectral reflectance data of 14 color test samples for CRI

Description

TCSdata is a table with the spectral reflectance data of 14 color test samples for CRI.

Usage

TCSdata

Format

This data frame contains the following data:

wavelength wavelength (nm)

TCS1 spectral reflectance data for sample 1

TCS2 spectral reflectance data for sample 2

TCS3 spectral reflectance data for sample 3

TCS4 spectral reflectance data for sample 4

TCS5 spectral reflectance data for sample 5

TCS6 spectral reflectance data for sample 6

TCS7 spectral reflectance data for sample 7

TCS8 spectral reflectance data for sample 8

TCS9 spectral reflectance data for sample 9

TCS10 spectral reflectance data for sample 10

TCS11 spectral reflectance data for sample 11

TCS12 spectral reflectance data for sample 12

TCS13 spectral reflectance data for sample 13

TCS14 spectral reflectance data for sample 14

Author(s)

Jose Gama

Source

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpip/lightinganswers/pdf/print/lightsources.pdf>

References

Rensselaer Polytechnic Institute Light Sources and Color Q & A Appendix B: MATLAB script for calculating measures of light source color: CCT, CRI, GA, and FSI <https://www.lrc.rpi.edu/programs/nlpi/lightinganswers/pdf/print/lightsources.pdf>

Examples

```
data(TCSdata)
TCSdata
```

tristimulusMunsell *434 Munsell colors with tristimulus and CMFs for a few illuminants*

Description

tristimulusMunsell is a table with 434 Munsell colors with tristimulus and Color matching functions for illuminants A, C D and S.

Usage

```
tristimulusMunsell
```

Format

This data frame contains the following data:

Munsell Munsell color notation
X.A tristimulus X for illuminant A
Y.A tristimulus Y for illuminant A
Z.A tristimulus Z for illuminant A
x.A CMF x for illuminant A
y.A CMF y for illuminant A
X.C tristimulus X for illuminant C
Y.C tristimulus Y for illuminant C
Z.C tristimulus Z for illuminant C
x.C CMF x for illuminant C
y.C CMF y for illuminant C
X.D tristimulus X for illuminant D
Y.D tristimulus Y for illuminant D
Z.D tristimulus Z for illuminant D
x.D CMF x for illuminant D
y.D CMF y for illuminant D

X.S tristimulus for X illuminant S
Y.S tristimulus for Y illuminant S
Z.S tristimulus for Z illuminant S
x.S CMF x for illuminant S
y.S CMF y for illuminant S
X Munsell painting number

Author(s)

Jose Gama

Source

K. L. Kelley, K. S. Gibson, and D. Nickerson, 1943 "Tristimulus specification of the Munsell Book of Color from spectrophotometric measurements," J. Opt. Soc. Am. 33, 355–376

References

K. L. Kelley, K. S. Gibson, and D. Nickerson, 1943 "Tristimulus specification of the Munsell Book of Color from spectrophotometric measurements," J. Opt. Soc. Am. 33, 355–376

Examples

```
data(tristimulusMunsell)
tristimulusMunsell
```

VosEstevezWalraven2degConeFundamentals1990

Vos, Estévez & Walraven (1990) 2-deg cone fundamentals

Description

VosEstevezWalraven2degConeFundamentals1990 Vos, Estévez & Walraven (1990) 2-deg fundamentals based on the Stiles & Burch 2-deg CMFs.

Usage

```
VosEstevezWalraven2degConeFundamentals1990
```

Format

This data frame contains the following data:

wlnm wavelength (nm)
L2 L-cone spectral sensitivity, L2(lambda)
M2 M-cone spectral sensitivity, M2(lambda)
S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(VosEstevezWalraven2degConeFundamentals1990)
VosEstevezWalraven2degConeFundamentals1990
```

VosWalraven2degConeFundamentals1971

Vos & Walraven(1971) 2-deg cone fundamentals

Description

VosWalraven2degConeFundamentals1971 Vos & Walraven(1971) 2-deg cone fundamentals based on the CIE Judd-Vos 2-deg CMFs.

Usage

```
VosWalraven2degConeFundamentals1971
```

Format

This data frame contains the following data:

wlnm wavelength (nm)

L2 L-cone spectral sensitivity, L2(lambda)

M2 M-cone spectral sensitivity, M2(lambda)

S2 S-cone spectral sensitivity, S2(lambda)

Author(s)

Jose Gama

Source

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

References

The Colour & Vision Research laboratory(CVRL) Institute of Ophthalmology, University College London www.cvrl.org

Examples

```
data(VosWalraven2degConeFundamentals1971)
VosWalraven2degConeFundamentals1971
```

WestlandBlacknessIndex

Westland, et al. blackness index

Description

WestlandBlacknessIndex (Westland, et al., 2006) blackness index.

Usage

```
WestlandBlacknessIndex(CIELabMatrix)
```

Arguments

CIELabMatrix CIELab coordinates

Value

blackness index

Author(s)

Jose Gama

Source

Westland, S.; Cheung, T. L. V.; Lozman, O. R., 2006. A metric for predicting perceptual blackness. 14th Color Imaging Conference Final Program and Proceedings, 14-17.

References

Westland, S.; Cheung, T. L. V.; Lozman, O. R., 2006. A metric for predicting perceptual blackness. 14th Color Imaging Conference Final Program and Proceedings, 14-17.

Examples

```
CIELab<-c(34.78467, 28.15159, 3.024663)
WestlandBlacknessIndex(CIELab)
```

whitepointsilluminants

White points of standard illuminants

Description

whitepointsilluminants is a table with White points of standard illuminants.

Usage

```
whitepointsilluminants
```

Format

This data frame contains the following data:

illuminant illuminant

description description

x2 x2

y2 y2

x10 x10

y10 y10

CCT CCT

Author(s)

Jose Gama

Source

Wikipedia, 2014 White points of standard illuminants https://en.wikipedia.org/wiki/Standard_illuminant

References

Wikipedia, 2014 White points of standard illuminants https://en.wikipedia.org/wiki/Standard_illuminant

Examples

```
data(whitepointsilluminants)
whitepointsilluminants
```

whitepointsRGB *Primaries for RGB color spaces*

Description

whitepointsRGB is a table with primaries for RGB color spaces.

Usage

```
whitepointsRGB
```

Format

This data frame contains the following data:

xRed Primary red x
yRed Primary red y
xGreen Primary green x
yGreen Primary green y
xBlue Primary blue x
yBlue Primary blue y
whitepointilluminant illuminant
gamma gamma
description Color space name

Author(s)

Jose Gama

Source

Wikipedia, 2014 RGB color space https://en.wikipedia.org/wiki/RGB_color_space

References

Wikipedia, 2014 RGB color space https://en.wikipedia.org/wiki/RGB_color_space

Examples

```
data(whitepointsRGB)  
whitepointsRGB
```

`w1nm2XYZ`*Approximates wavelength to CIE tristimulus XYZ*

Description

`w1nm2XYZ` Approximates wavelength to CIE tristimulus XYZ, by interpolation.

`w1nm2xyz` Approximates wavelength to CIE xyz, by interpolation.

Usage

`w1nm2XYZ(wavelength)`

Arguments

`wavelength` `wavelength`

Value

CIE XYZ

Author(s)

Jose Gama

Examples

`w1nm2XYZ(555)`

`xFit_1931`*Approximations from wavelengths to XYZ by Wyman et al*

Description

`xFit_1931` Approximations from wavelengths to XYZ by Wyman et al.

Usage

`xFit_1931(wave)`

Arguments

`wave` `wavelength data`

Value

XYZ X, Y or Z coordinate

Author(s)

Jose Gama

Source

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

References

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

Examples

xFit_1931(555)
yFit_1931(555)
zFit_1931(555)

xy2CCT.HernandezAndres

*convert from chromaticity coordinates to correlated color temperature
(Hernandez Andres)*

Description

xy2CCT.HernandezAndres convert from chromaticity coordinates to correlated color temperature (approximation) by Hernandez Andres.

Usage

xy2CCT.HernandezAndres(x,y)

Arguments

x	x coordinates
y	y coordinates

Value

CCT (Hernandez Andres)

Author(s)

Jose Gama

Source

Hernandez-Andres, et al. 1999 "Calculating correlated color temperatures across the entire gamut of daylight and skylight chromaticities" https://en.wikipedia.org/wiki/Color_temperature

References

Hernandez-Andres, et al. 1999 "Calculating correlated color temperatures across the entire gamut of daylight and skylight chromaticities" https://en.wikipedia.org/wiki/Color_temperatures

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
xy2CCT.HernandezAndres(xyY[1], xyY[2])
```

```
xy2CCT.McCamy
```

convert from chromaticity coordinates to correlated color temperature

Description

xy2CCT.McCamy convert from chromaticity coordinates to correlated color temperature (approximation).

Usage

```
xy2CCT.McCamy(x, y)
```

Arguments

x	x coordinates
y	y coordinates

Value

CCT McCamy

Author(s)

Jose Gama

Source

C. S. McCamy, 1992 "Correlated color temperature as an explicit function of chromaticity coordinates" Color Research & Application Volume 17, Issue 2, pages 142–144

References

C. S. McCamy, 1992 "Correlated color temperature as an explicit function of chromaticity coordinates" Color Research & Application Volume 17, Issue 2, pages 142–144

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
xy2CCT.McCamy(xyY[1],xyY[2])
```

xyChromaticitiesVos1978

x, y coordinates transformed to Judd (1951) x', y' system

Description

xyChromaticitiesVos1978 x, y coordinates transformed to Judd (1951) x', y' system.

Usage

```
xyChromaticitiesVos1978(x,y)
```

Arguments

x	x coordinate
y	y coordinate

Value

x', y' coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
xyChromaticitiesVos1978(xyY[1],xyY[2])
```

xyY2XYZ

Convert CIE CMF to XYZ

Description

xyY2XYZ Converts CIE CMF to XYZ.

Usage

xyY2XYZ(xyYmatrix)

Arguments

xyYmatrix CIE CMFs

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

References

Logicol S.r.l., 2014 EasyRGB color search engine <http://www.easyrgb.com/>

Examples

xyY2XYZ(c(0.310897, 0.306510, 74.613450))

XYZ2BVR

convert from XYZ coordinates to BVR

Description

XYZ2BVR convert from XYZ coordinates to BVR.

Usage

XYZ2BVR(XYZmatrix)

Arguments

XYZmatrix XYZ coordinates

Value

BVR coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2BVR(XYZ)
```

XYZ2CCT.Robertson *convert from chromaticity coordinates to correlated color temperature (Robertson)*

Description

XYZ2CCT.Robertson convert from chromaticity coordinates to correlated color temperature (approximation) by Robertson.

Usage

```
XYZ2CCT.Robertson(X, Y, Z)
```

Arguments

X X coordinates
Y Y coordinates
Z Z coordinates

Value

CCT (Robertson)

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ2CCT.Robertson( 0.11465380, 0.08391198, 0.08222077 )
```

XYZ2HunterLab

convert from XYZ coordinates to Hunter Lab coordinates

Description

XYZ2HunterLab convert from XYZ coordinates to Hunter Lab coordinates.

Usage

```
XYZ2HunterLab(XYZmatrix, illuminant='D65', observer=2,
  RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

Hunter Lab coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2HunterLab(XYZ)
```

XYZ2Lab

convert from XYZ coordinates to CIE Lab coordinates

Description

XYZ2Lab convert from XYZ coordinates to CIE Lab coordinates.

Usage

```
XYZ2Lab(XYZmatrix, illuminant='D65', observer=2,
        RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

CIE Lab coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
CIELMatrix<-XYZ2Lab(XYZ*100)
```

XYZ2LMS

Convert XYZ coordinates to LMS

Description

XYZ2LMS Converts XYZ coordinates to LMS.

Usage

```
XYZ2LMS(XYZmatrix)
```

Arguments

XYZmatrix XYZ coordinates

Value

LMS coordinates

Author(s)

Jose Gama

Source

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

References

Francoise Vienot, Hans Brettel, John D. Mollon, 1999 Digital Video Colourmaps for Checking the Legibility of Displays by Dichromats Color Research & Application John Wiley & Sons, Inc.

Examples

```
XYZ<-c(21.43162, -3.20673, 120.6259)
XYZ2LMS(XYZ)
```

`XYZ2Luv`*convert from XYZ coordinates to CIE Luv coordinates*

Description

XYZ2Luv convert from XYZ coordinates to CIE Luv coordinates.

Usage

```
XYZ2Luv(XYZmatrix, illuminant='D65', observer=2,  
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

CIE Luv coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)  
CIELuvMatrix<-XYZ2Luv(XYZ*100)
```

XYZ2RGB*convert from XYZ coordinates to CIE RGB coordinates*

Description

XYZ2RGB convert from XYZ coordinates to CIE RGB coordinates.

Usage

```
XYZ2RGB(XYZmatrix, illuminant = "D65", observer = 2, RefWhite
        = get("XYZperfectreflectingdiffuser", envir = environment()),
        RGBModel = "sRGB", RefWhiteRGB = get("whitepointsRGB",
        envir = environment()), gamma = NA,
        RefWhiteIllum = get("XYZperfectreflectingdiffuser",
        envir = environment()), CAT = "Bradford",
        CATarray = get("ChromaticAdaptation", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White
RGBModel	RGB model
RefWhiteRGB	white points for RGB model
gamma	gamma
RefWhiteIllum	Reference perfect reflecting diffuser
CAT	CAT
CATarray	Chromatic Adaptation

Value

CIE RGB coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2RGB(XYZ)
```

XYZ2RxRyRz	<i>convert from XYZ to three filter measurements (reflectance factors)</i>
------------	--

Description

XYZ2RxRyRz convert from XYZ to three filter measurements (reflectance factors).

Usage

```
XYZ2RxRyRz(XYZmatrix=NA,illuminant='C', observer=2,
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ matrix
illuminant	illuminant
observer	observer
RefWhite	White Reference

Value

CIE XYZ coordinates

Author(s)

Jose Gama

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2RxRyRz(XYZ)
```

`XYZ2xyY`*convert from XYZ coordinates to xyY coordinates*

Description

XYZ2xyY convert from XYZ coordinates to xyY coordinates.

Usage

```
XYZ2xyY(XYZmatrix, illuminant='D65', observer=2,  
RefWhite=get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

XYZmatrix	XYZ coordinates
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

xyY coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)  
XYZ2xyY(XYZ)
```

XYZ2Yuv	<i>convert from XYZ coordinates to Yuv coordinates</i>
---------	--

Description

XYZ2Yuv convert from XYZ coordinates to Yuv coordinates.

Usage

```
XYZ2Yuv(XYZmatrix)
```

Arguments

XYZmatrix XYZ coordinates

Value

Yuv coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZ<-c(0.11465380, 0.08391198, 0.08222077)
XYZ2Yuv(XYZ)
```

XYZMoonSpencer1945 *Approximations from wavelengths to XYZ by Moon & Spencer*

Description

XYZMoonSpencer1945 Approximations from wavelengths to XYZ by Moon & Spencer.

Usage

XYZMoonSpencer1945(wavelen)

Arguments

wavelen wavelength data

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

References

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

Examples

XYZMoonSpencer1945(555)

XYZperfectreflectingdiffuser
Perfect reflecting diffuser data

Description

XYZperfectreflectingdiffuser table with perfect reflecting diffuser data.

Format

This data frame contains the following columns:

Illuminant Illuminant

X2 CIE tristimulus X 2 deg observer

Y2 CIE tristimulus Y 2 deg observer

Z2 CIE tristimulus Z 2 deg observer

X10 CIE tristimulus X 10 deg observer

Y10 CIE tristimulus Y 10 deg observer

Z10 CIE tristimulus Z 10 deg observer

Author(s)

Jose Gama

Source

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

References

Wyszecki, G. and Stiles, W.S., 1982 Color Science: Concepts and Methods, Quantitative data and formulae. John Wiley & Sons.

Examples

```
data(XYZperfectreflectingdiffuser)
str(XYZperfectreflectingdiffuser)
```

XYZTannenbaum1974 *Approximations from wavelengths to XYZ by Tannenbaum 1974*

Description

XYZTannenbaum1974 Approximations from wavelengths to XYZ by Tannenbaum 1974.

Usage

XYZTannenbaum1974(wavelen)

Arguments

wavelen wavelength data

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

References

Chris Wyman Peter-Pike Sloan Peter Shirley, 2013 Simple Analytic Approximations to the CIE XYZ Color Matching Functions Journal of Computer Graphics Techniques Vol. 2, No. 2

Examples

XYZTannenbaum1974(555)

`XYZtoRGB`*convert from XYZ coordinates to RGB*

Description

XYZtoRGB convert from XYZ coordinates to RGB.

Usage

```
XYZtoRGB(xc, yc, zc, ColorSystem = c(0.67, 0.33, 0.21, 0.71,  
                                     0.14, 0.08, 0.31, 0.316))
```

Arguments

<code>xc</code>	XYZ X coordinates
<code>yc</code>	XYZ Y coordinates
<code>zc</code>	XYZ Z coordinates
<code>ColorSystem</code>	RGB Color System data

Value

RGB coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
XYZtoRGB(0.11465380, 0.08391198, 0.08222077)
```

Y2MunsellV *CIE XYZ "Y" to Munsell value*

Description

Y2MunsellV CIE XYZ "Y" to Munsell value.

Usage

Y2MunsellV(Y)

Arguments

Y Y data

Value

Munsell value

Author(s)

Jose Gama

Source

ASTM, 2008 ASTM Standard D1535-08

References

ASTM, 2008 ASTM Standard D1535-08

Examples

Y2MunsellV(5)

Y2MunsellVtable1D1535 *CIE XYZ "Y" to Munsell value formula, based on the ASTM Standard D1535-08*

Description

Y2MunsellVtable1D1535 NLSQ regression for obtaining similar results to table 1 from ASTM Standard D1535-08.

Usage

Y2MunsellVtable1D1535(Y)

Arguments

Y Y data

Value

Munsell value

Author(s)

Jose Gama

Source

ASTM, 2008 ASTM Standard D1535-08

References

ASTM, 2008 ASTM Standard D1535-08

Examples

Y2Munsell1Vtable1D1535(5)

YCbCr2RGB

Convert YCbCr coordinates to RGB

Description

YCbCr2RGB Converts YCbCr coordinates to RGB.

Usage

YCbCr2RGB(YPbPrmatrix)

Arguments

YPbPrmatrix YPbPr coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
YCbCr2RGB(c(18165.831, -625.617, 6558.790))
```

YIQ2RGB

Convert YIQ coordinates to RGB

Description

YIQ2RGB Converts YIQ coordinates to RGB.

Usage

```
YIQ2RGB(YIQmatrix)
```

Arguments

YIQmatrix YIQ coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
YIQ2RGB(c(82.949, 31.51965, 17.58261))
```

YPbPr2RGB

Convert YCbCr coordinates to RGB

Description

YPbPr2RGB Converts YCbCr coordinates to RGB.

Usage

```
YPbPr2RGB(YPbPrmatrix)
```

Arguments

YPbPrmatrix YPbPr coordinates

Value

RGB coordinates

Author(s)

Jose Gama

Source

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

References

Alex Izvorski, Copyright 2003-2005 (Portions Copyright 2001-2003 by Alfred Reibenschuh) Graphics/ColorObject version 0.5.0 https://www.poynton.ca/notes/colour_and_gamma/ColorFAQ.txt

Examples

```
YPbPr2RGB(c(82.949000, -2.792896, 29.280320))
```

Yuv2Luv

Convert Yuv coordinates to Luv

Description

Yuv2Luv Converts Yuv coordinates to Luv.

Usage

```
Yuv2Luv(Yu.v.matrix, illuminant = "D65", observer = 2,  
        RefWhite = get("XYZperfectreflectingdiffuser", envir = environment()))
```

Arguments

Yu.v.matrix	Yuv matrix
illuminant	illuminant
observer	observer
RefWhite	Reference White

Value

Luv coordinates

Author(s)

Jose Gama

Examples

```
Yuv <- c(0.08391198, 0.2830965, 0.4661789)  
Yuv2Luv(Yuv)
```

YUV2RGB*Convert YUV coordinates to RGB*

Description

YUV2RGB Converts YUV coordinates to RGB.

Usage

```
YUV2RGB(YUVmatrix)
```

Arguments

YUVmatrix	YUV coordinates
-----------	-----------------

Value

RGB coordinates

Author(s)

Jose Gama

Examples

```
YUV2RGB(c(164.898, -5.584651, 58.53939))
```

Yuv2xy

convert from Yuv coordinates to xy coordinates

Description

Yuv2xy convert from Yuv coordinates to xy coordinates.

Usage

```
Yuv2xy(Yu.v.matrix)
```

Arguments

Yu.v.matrix Yuv coordinates

Value

xy coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
Yuv <- c(0.08391198, 0.2830965, 0.4661789)
Yuv2xy(Yuv)
```

Yuv2XYZ	<i>convert from Yuv coordinates to XYZ coordinates</i>
---------	--

Description

Yuv2XYZ convert from Yuv coordinates to XYZ coordinates.

Usage

```
Yuv2XYZ(Yu.v.matrix)
```

Arguments

Yu.v.matrix Yuv coordinates

Value

XYZ coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
Yuv <- c(0.08391198, 0.2830965, 0.4661789)
Yuv2XYZ(Yuv)
```

Yxy2CIE1960UCS *convert from Yxy coordinates to CIE 1960 UCS*

Description

Yxy2CIE1960UCS convert from Yxy coordinates to CIE 1960 UCS.

Usage

```
Yxy2CIE1960UCS(Yxymatrix)
```

Arguments

Yxymatrix Yxy coordinates

Value

CIE 1960 UCS

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
Yxy2CIE1960UCS(xyY[c(3,1,2)])
```

`Yxy2Yuv`*convert from Yxy coordinates to Yuv coordinates*

Description

Yxy2Yuv convert from Yxy coordinates to Yuv coordinates.

Usage

```
Yxy2Yuv(Yxymatrix)
```

Arguments

Yxymatrix Yxy coordinates

Value

Yuv coordinates

Author(s)

Jose Gama

Source

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

References

Bruce Justin Lindbloom, 2014 http://www.brucelindbloom.com/index.html?Eqn_XYZ_to_T.html

Examples

```
xyY <- c(0.4083308, 0.2988462, 0.08391198)
Yxy2Yuv(xyY[c(3,1,2)])
```

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