Package 'cdlTools'

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Title Tools to Download and Work with USDA Cropscape Data

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Description Downloads USDA National Agricultural Statistics Service (NASS) cropscape data for a specified state. Utilities for fips, abbreviation, and name conversion are also provided. Full functionality requires an internet connection, but data sets can be cached for later off-line use.

License Unlimited

LazyData true

Imports RCurl, raster, XML, rgdal

RoxygenNote 5.0.1

NeedsCompilation yes

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R topics documented:

`cdlTools-package` *Cropland Data Layer Tools*

Description

Tools to obtain and use CDL data with the raster package.

Details

Package:	cdlTools
Type:	Package
Version:	0.1
Date:	2014-08-26
License:	Unlimited

This package allows for simple retreival of agricultural land cover in the United States through USDA's Cropland Data Layer (CDL). The most useful functions are getCDL, a function to download CDL data by state. updateNamesCDL, a function to apply class descriptions to the enumerated CDL data.

Author(s)

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References

Boryan, Claire, et al. "Monitoring US agriculture: the US department of agriculture, national agricultural statistics service, cropland data layer program." Geocarto International 26.5 (2011): 341-358.

Examples

```
## Not run:
# copy data to a local directory
cdlRaster <- getCDL("Rhode Island",c(2012,2013),location="/tmp")

# get land land cover change between 2012 and 2013
landCoverChange <- matchCount(cdlRaster$'2012',cdlRaster$'2013')
```

```
# convert to data frame
landCoverChange.df <- as.data.frame(landCoverChange)

# convert CDL category enumerations to text
landCoverChange.df[c('CDL_2012_44','CDL_2013_44')] <-
  lapply(landCoverChange.df[c('CDL_2012_44','CDL_2013_44')],updateNamesCDL)

## End(Not run)
```

`census2010FIPS` *U.S. Census 2010 FIPS Data*

Description

U.S. Census 2010 FIPS Data containing county names, state and county FIPS codes, and state abbreviations.

Usage

```
census2010FIPS
```

Format

A data frame with 3235 rows and 5 variables.

State State two letter abbreviation

State.ANSI State FIPS code

County.ANSI County FIPS code

County.Name County Name

ANSI.Cl FIPS class code

Source

http://www2.census.gov/geo/docs/reference/codes/files/national_county.txt

corn *CDL corn classes*

Description

An array of CDL enumerations that contain corn. The corn enumeration contains:

- 1 - Corn
- 225 - Double Crop, Winter Wheat and Corn
- 226 - Double Crop, Oats and Corn
- 237 - Double Crop, Barley and Corn
- 241 - Double Crop, Corn and Soybeans
- 251 - Non-Irrigated Corn

Usage

```
corn
```

Format

An object of class `numeric` of length 6.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

cotton *CDL cotton classes*

Description

An array of CDL enumerations that contain cotton. The cotton enumeration contains:

- 2 - Cotton
- 232 - Double Crop, Lettuce and Cotton
- 238 - Double Crop, Winter Wheat and Cotton
- 239 - Double Crop, Soybeans and Cotton

Usage

```
cotton
```

Format

An object of class `numeric` of length 4.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

---

`cultivated` *CDL cultivated classes*

Description

An array of CDL enumerations of cultivated land cover. Not all cultivated enumerations have labels as of this time, and are reserved for future land cover classes. The cultivated enumeration contains:

- 1 - Corn
- 2 - Cotton
- 3 - Rice
- 4 - Sorghum
- 5 - Soybeans
- 6 - Sunflower
- 7 - 7
- 8 - 8
- 9 - 9
- 10 - Peanuts
- 11 - Tobacco
- 12 - Sweet Corn
- 13 - Pop or Ornamental Corn
- 14 - Mint
- 15 - 15
- 16 - 16
- 17 - 17
- 18 - 18
- 19 - 19
- 20 - 20
- 21 - Barley
- 22 - Durum Wheat
- 23 - Spring Wheat
- 24 - Winter Wheat
- 25 - Other Small Grains
- 26 - Double Crop Winter Wheat and Soybeans
- 27 - Rye

- 28 - Oats
- 29 - Millet
- 30 - Speltz
- 31 - Canola
- 32 - Flaxseed
- 33 - Safflower
- 34 - Rape Seed
- 35 - Mustard
- 36 - Alfalfa
- 38 - Camelina
- 39 - Buckwheat
- 40 - 40
- 41 - Sugarbeets
- 42 - Dry Beans
- 43 - Potatoes
- 44 - Other Crops
- 45 - Sugarcane
- 46 - Sweet Potatoes
- 47 - Misc Vegs and Fruits
- 48 - Watermelons
- 49 - Onions
- 50 - Cucumbers
- 51 - Chick Peas
- 52 - Lentils
- 53 - Peas
- 54 - Tomatoes
- 55 - Caneberries
- 56 - Hops
- 57 - Herbs
- 58 - Clover or Wildflowers
- 61 - Fallow or Idle Cropland
- 66 - Cherries
- 67 - Peaches
- 68 - Apples
- 69 - Grapes
- 71 - Other Tree Crops
- 72 - Citrus

- 73 - 73
- 74 - Pecans
- 75 - Almonds
- 76 - Walnuts
- 77 - Pears
- 78 - 78
- 79 - 79
- 80 - 80
- 96 - 96
- 196 - 196
- 197 - 197
- 198 - 198
- 199 - 199
- 200 - 200
- 201 - 201
- 202 - 202
- 203 - 203
- 204 - Pistachios
- 205 - Triticale
- 206 - Carrots
- 207 - Asparagus
- 208 - Garlic
- 209 - Cantaloupes
- 210 - Prunes
- 211 - Olives
- 212 - Oranges
- 213 - Honeydew Melons
- 214 - Broccoli
- 215 - 215
- 216 - Peppers
- 217 - Pomegranates
- 218 - Nectarines
- 219 - Greens
- 220 - Plums
- 221 - Strawberries
- 222 - Squash
- 223 - Apricots

- 224 - Vetch
- 225 - Double Crop Winter Wheat and Corn
- 226 - Double Crop Oats and Corn
- 227 - Lettuce
- 228 - 228
- 229 - Pumpkins
- 230 - Double Crop Lettuce and Durum Wheat
- 231 - Double Crop Lettuce and Cantaloupe
- 232 - Double Crop Lettuce and Cotton
- 233 - Double Crop Lettuce and Barley
- 234 - Double Crop Durum Wheat and Sorghum
- 235 - Double Crop Barley and Sorghum
- 236 - Double Crop Winter Wheat and Sorghum
- 237 - Double Crop Barley and Corn
- 238 - Double Crop Winter Wheat and Cotton
- 239 - Double Crop Soybeans and Cotton
- 240 - Double Crop Soybeans and Oats
- 241 - Double Crop Corn and Soybeans
- 242 - Blueberries
- 243 - Cabbage
- 244 - Cauliflower
- 245 - Celery
- 246 - Radishes
- 247 - Turnips
- 248 - Eggplants
- 249 - Gourds
- 250 - Cranberries
- 251 - Non-Irrigated Corn
- 252 - Non-Irrigated Soybeans
- 253 - Non-Irrigated Winter Wheat
- 254 - Double Crop Barley and Soybeans
- 255 - Non-Irrigated Double Crop Winter Wheat and Soybeans

Usage

```
cultivated
```

Format

An object of class `numeric` of length 133.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

---

durumWheat *CDL durum wheat classes*

Description

An array of CDL enumerations that contain durum wheat. The durum wheat enumeration contains:

- 22 - Durum Wheat
- 230 - Double Crop Lettuce and Durum Wheat
- 234 - Double Crop Durum Wheat and Sorghum

Usage

```
durumWheat
```

Format

An object of class `numeric` of length 3.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

---

fips *FIPS code conversion function.*

Description

`fips` converts U.S. state names and abbreviations to and from FIPS codes.

Usage

```
fips(x, to = "FIPS")
```

Arguments

`x`	A character string or numeric FIPS code. Character input can be the two-letter postal abbreviation, the full name of a state, or a FIPS code in character format. The string is case insensitive. FIPS codes are the only numeric input supported.
`to`	A character string of output type: "FIPS" will return a numeric fips code. "Abbreviation" will return a two letter state abbreviation. "Name" will return the full state name with spaces. The default output is a numeric FIPS code.

Details

The Federal Information Processing Standard (FIPS) provides a set of standard numeric codes for refering to U.S. states. This function converts between FIPS codes, state two letter abbreviations, and full state names.

Value

The output type specified by the "to" argument. If no match can be made, the program returns NA.

Examples

```
fips("ia")
fips('northcarolina', to='Abbreviation')
fips('North Carolina')
fips(44,to='Name')
```

`getCDL` *Get CDL raster data*

Description

`getCDL` retrieves CDL state raster objects for a set of years.

Usage

```
getCDL(x, year, alternativeUrl, location)
```

Arguments

`x`	Is either a two digit state FIPS code, a two letter abbreviation, or a state name.
`year`	A numerical vector. A set of years of CDL data to download.
`alternativeUrl`	An optional string containing an alternative url.
`location`	An optional string containing a location to store the file.

Value

A list of CDL raster objects of interested county for a set of years.

Examples

```
## Not run:
getCDL(6,c(2013,2015))
getCDL("California",c(2013,2015))
getCDL("CA",c(2013,2015))

## End(Not run)
```

matchCount *Counts distinct pixel pairs in CDL raster images*

Description

matchCount counts distinct pixel pairs for CDL raster images with same extents and resolution.

Usage

```
matchCount(x, y, m = 256)
```

Arguments

x	A CDL raster image.
y	A CDL raster image.
m	A bound for the max enumeration of CDL categories. The default is 256.

Value

A matrix with pixel counts by unique ordered CDL crop pairs in x and y.

Examples

```
## Not run:
z1 <- matrix( rep(c(1,4),8), nrow=4)
z2 <- matrix( rep(c(1:4),4), nrow=4)

r1 <- raster(z1)
r2 <- raster(z2)

a <- matchCount(r1,r2)

## End(Not run)
```

nothing *CDL nothing class*

Description

An array of CDL enumerations that contain the nothing class. The nothing enumeration contains:

- 0 - Background

Usage

```
nothing
```

Format

An object of class numeric of length 1.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

---

pasture *CDL pasture classes*

Description

An array of CDL enumerations that contain pasture. The pasture enumeration contains:

- 37 - Other Hay/Non Alfalfa
- 38 - Camelina
- 39 - Buckwheat
- 62 - Pasture/Grass
- 171 - Grassland Herbaceous

Usage

```
pasture
```

Format

An object of class numeric of length 5.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

---

projCDL *The default projection of CDL data*

Description

The proj4 string used for all CDL data. "+proj=aea +lat_1=29.5 +lat_2=45.5 +lat_0=23 +lon_0=-96 +x_0=0 +y_0=0 +datum=NAD83 +units=m +no_defs +ellps=GRS80 +towgs84=0,0,0"

Usage

```
projCDL
```

Format

An object of class `character` of length 1.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

---

soybeans *CDL soybeans classes*

Description

An array of CDL enumerations that contain soybeans. The soybeans enumeration contains:

- 5 - Soybeans
- 26 - Double Crop Winter Wheat and Soybeans
- 239 - Double Crop Soybeans and Cotton
- 240 - Double Crop Soybeans and Oats
- 241 - Double Crop Corn and Soybeans
- 252 - Non-Irrigated Soybeans
- 254 - Double Crop Barley and Soybeans
- 254 - Double Crop Barley and Soybeans
- 255 - Non-Irrigated Double Crop Winter Wheat and Soybeans

Usage

```
soybeans
```

Format

An object of class `numeric` of length 9.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

springWheat *CDL spring wheat classes*

Description

An array of CDL enumerations that contain spring wheat. The spring wheat enumeration contains:

- 23 - Spring Wheat

Usage

```
springWheat
```

Format

An object of class `numeric` of length 1.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

---

stateNames *U.S. Census 2010 State FIPS Data*

Description

U.S. Census 2010 State FIPS Data containing names, FIPS codes, and abbreviations.

Usage

```
stateNames
```

Format

An object of class `data.frame` with 54 rows and 3 columns.

Details

STATE State two letter abbreviation

STATENAME State name

STATEFP State FIPS code

Source

http://www2.census.gov/geo/docs/reference/codes/files/national_county.txt

updateNamesCDL *Label CDL classes.*

Description

updateNamesCDL converts numeric CDL categories to class labels.

Usage

```
updateNamesCDL(y)
```

Arguments

y	A numeric array of integers associated with CDL categories.

Value

An array of strings labeling each CDL class. If the CDL class is unspecified then the original integer is returned.

Examples

```
updateNamesCDL(0:255)
```

varNamesCDL *Enumerated CDL classes*

Description

A list of enumerated CDL classes and class descriptions.

Usage

```
varNamesCDL
```

Format

An object of class character of length 278.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

water *CDL water classes*

Description

An array of CDL enumerations that contain water. The water enumeration contains:

- 83 - Water
- 111 - Open Water

Usage

```
water
```

Format

An object of class `numeric` of length 2.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

winterWheat *CDL winter wheat classes*

Description

An array of CDL enumerations that contain winter wheat. The winter wheat enumeration contains:

- 24 - Winter Wheat
- 26 - Double Crop Winter Wheat and Soybeans
- 225 - Double Crop Winter Wheat and Corn
- 236 - Double Crop Winter Wheat and Sorghum
- 238 - Double Crop Winter Wheat and Cotton
- 253 - Non-Irrigated Winter Wheat
- 255 - Non-Irrigated Double Crop Winter Wheat and Soybeans

Usage

```
winterWheat
```

Format

An object of class `numeric` of length 7.

Source

https://www.nass.usda.gov/Research_and_Science/Cropland/metadata/meta.php

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