Introduction to R Software

Swayam Prabha

Lecture 29

Factors

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Slides can be downloaded from

http://home.iitk.ac.in/~shalab/sp

Categorical variables

Quantitative variables

Example:

Height (in meters) – 1.65, 1.76, …

Qualitative variables

Example:

Gender – Male, Female

Performance – Excellent, Good, Average, Bad …

Categorical variables

Categorical variables

Example:

X : Gender – Male, Female

X = 0 if a person is male

X = 1 if a person is female

Example:

Performance	Excellent	Average	Good	Bad	Labels
X	1	2	3	4	Numeric codes

The categories are stored internally as numeric codes, with labels to provide meaningful names for each code.

Factors

Factors represent categorical variables and are used as grouping indicators.

Factors

Example:

Suppose we denote the three colours of balls in a basket by following numbers:

Red = 1, Blue = 2, Green = 3

Suppose we draw five balls with following colours:

Red, Green, Green, Blue, Red

This outcome of colours can be coded by numbers

Factors

Each character is mapped to a code.

Factors represent categorical variables and are used as grouping indicators.

The categories are stored internally as numeric codes, with labels to provide meaningful names for each code.

Factors

The order of the labels is important.

First label is mapped to code 1.

Second label is mapped to code 2 and so on.

The values of the codes are always restricted to 1,2,. . .,k, to represent k discrete categories.

Here “Red" is mapped to code 1,

“Blue" is mapped to code 2 and

“Green” is mapped to code 3.

Factors

We have a vector of character strings or integers.

R’s term for a categorical variable is a factor.

In R, each possible value of a categorical variable is called a level.

A vector of levels is called a factor.

A categorical variable is characterized by a (here: finite) number of levels called as factor levels.

Factors

To define a factor, we start with

- **a vector of values,**
- **a second vector that gives the collection of possible values, and**
- **a third vector that gives labels to the possible values.**

Factors

The `factor` function encodes the vector of discrete values into a factor:

```
factor(x)
```

where `x` is a vector of strings or integers.

If the vector contains only a subset of possible values and not the entire values, then include a second argument that gives the possible levels of the factor:

```
factor(x, levels)
```

Factors

Usage

```
factor(x = character(), levels, labels =
levels, exclude = NA, …)
```

`levels` : Determines the categories of the factor variable.

Default is the sorted list of all the distinct values of `x`.

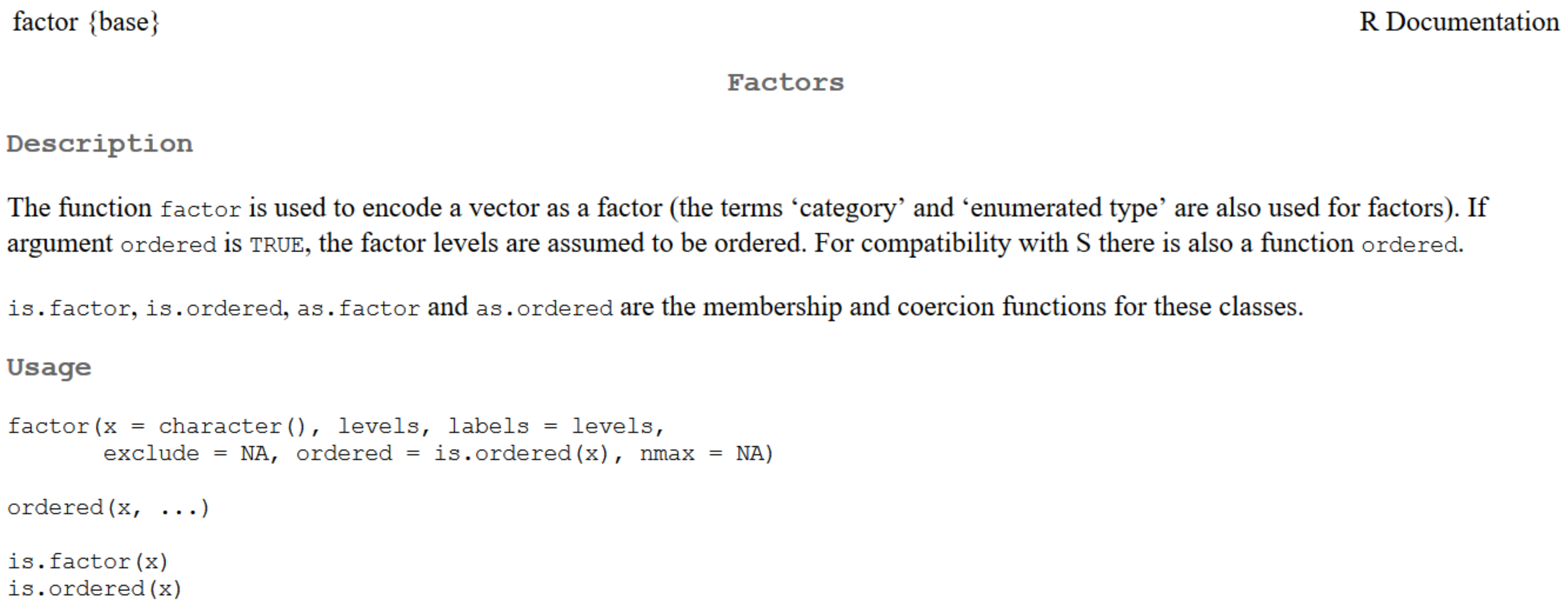
`labels` : (Optional) Vector of values that will be the labels of the categories in the `levels` argument.

`exclude` : (Optional) It defines which levels will be classified as NA in any output using the factor variable.

Factors

Look into `help`

```
> help("factor")
```



factor {base} R Documentation

Factors

Description

The function `factor` is used to encode a vector as a factor (the terms ‘category’ and ‘enumerated type’ are also used for factors). If argument `ordered` is `TRUE`, the factor levels are assumed to be ordered. For compatibility with S there is also a function `ordered`.

`is.factor`, `is.ordered`, `as.factor` and `as.ordered` are the membership and coercion functions for these classes.

Usage

```
factor(x = character(), levels, labels = levels,
       exclude = NA, ordered = is.ordered(x), nmax = NA)

ordered(x, ...)

is.factor(x)
is.ordered(x)
```

Factors

Example:

Suppose we roll a die seven times and observe the outcome in the vector y.

```
> y <- c(1, 4, 3, 5, 4, 2, 4)
```

Possible values of upper face of die are 1 to 6 and we store them in a vector `possible.dieface`

```
> possible.dieface <- c(1, 2, 3, 4, 5, 6)
```

Factors

Example:

We wish to label the rolls by the words “one”, “two”, ..., “six”.

We put these labels in the vector `labels.diefaces`:

```
> labels.dieface <- c("one", "two", "three",
"four", "five", "six")
```

Construct the factor variable `facy` using the function factor:

```
> facy <- factor(y, levels = possible.dieface,
labels = labels.dieface)
```

Factors

Example:

Observe the difference between a character vector and a factor.

```
> facy
[1] one four three five four two four
Levels: one two three four five six
```

Note that

```
y <- c(1, 4, 3, 5, 4, 2, 4)
```