Introducing xts and zoo objects

MANIPULATING TIME SERIES DATA WITH XTS AND ZOO IN R

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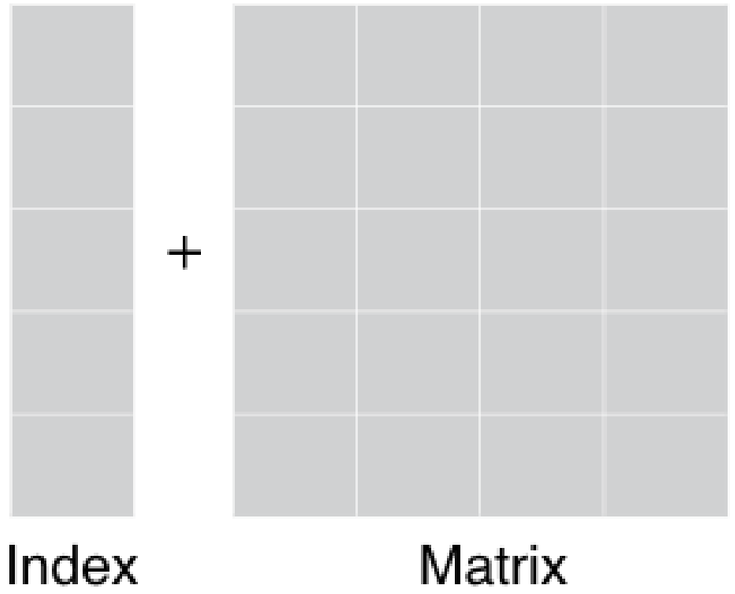
What is xts?

- eXtensible Time Series
- An extended zoo object
- Matrix + Index
- Observations + Times



An xts example

```
# XTS = MATRIX + INDEX
x <- matrix(1:4, ncos = 2, nrow = 2)
x
```

```
     [,1] [,2]
[1,]    1    3
[2,]    2    4
```

```
idx <- as.Date(c("2015-01-01", "2015-02-01"))
idx
```

```
"2015-01-01" "2015-02-01"
```

- Class: `Date`, `POSIX times`, `timeDate`, `chron`,...

An xts example

```
# XTS = MATRIX + INDEX
X <- xts(x, order.by = idx)
X
```

```
           [,1] [,2]
2015-01-01    1    3
2015-02-01    2    4
```

The xts constructor

```
xts(x = NULL,
    order.by = index(x),
    frequency = NULL,
    unique = NULL,
    tzone = Sys.getenv("TZ"))
```

- tzone: time zone of your series
- unique: forces times to be unique
- index is in increasing order of time

An xts example

```
# XTS = MATRIX + INDEX
X <- xts(x, order.by = idx)
X
```

```
           [,1] [,2]
2015-01-01    1    3
2015-02-01    2    4
```

Special xts behavior

- xts is a matrix with associated times for each observation
- Subsets preserve matrix form
- Attributes are preserved
  - i.e. a time-stamp that was acquired
- xts is a subclass of zoo

Deconstructing xts

- Use internal components
- `coredata(x)` is used to extract the data component

```
coredata(x, fmt = FALSE)
```

- `index(x)` to extract the index a.k.a. times

```
index(x)
```

Let's practice!

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Importing, exporting and converting time series

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datacamp

Reality check

- Data usually already exists, and needs wrangling
  - Often data isn't in your preferred class
- Data needs to be imported into R and converted to xts
- You will convert, read and export xts objects

Converting using as.xts()

```
# Load data from R datasets
data(sunspots)
class(sunspots)
```

```
"ts"
```

```
sunspots_xts <- as.xts(sunspots)
class(sunspots_xts)
```

```
"xts" "zoo"
```

```
head(sunspots_xts)
```

```
         [,1]
Jan 1749 58.0
Feb 1749 62.6
Mar 1749 70.0
Apr 1749 55.7
May 1749 85.0
Jun 1749 83.5
```

Importing external data to xts

- Read data into R using built in (or external) functions
  - i.e. `read.table()` , `read.csv()` , and `read.zoo()`
- Coerce data to xts using

```
as.xts(read.table("file"))
as.xts(read.zoo("file"))
```

Exporting xts from R

- Sometimes you will need your data outside of R
- Use `write.zoo()` for external use (i.e. text files)

```
write.zoo(x, "file")
```

- Use saveRDS for R use

```
saveRDS(x, "file")
```

Let's practice!

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