Taking differences of datetimes

WORKING WITH DATES AND TIMES IN R

Charlotte Wickham
Instructor

Arithmetic for datetimes

- `datetime_1 - datetime2` : Subtraction for time elapsed
- `datetime_1 + (2 * timespan)` : Addition and multiplication for generating new datetimes in the past or future
- `timespan1 / timespan2` : Division for change of units

Subtraction of datetimes

```
releases <- read_csv("rversions.csv")
last_release <- filter(releases, date == max(date))
```

```
Sys.Date() - last_release$date
```

```
Time difference of 99 days
```

```
difftime(Sys.Date(), last_release$date)
```

```
Time difference of 99 days
```

`time1 - time2` is the same as `difftime(time1, time2)`

difftime()

`units =` `"secs"`, `"mins"`, `"hours"`, `"days"`, or `"weeks"`

```
difftime(Sys.Date(), last_release$date, units = "secs")
```

```
Time difference of 8553600 secs
```

```
difftime(Sys.Date(), last_release$date, units = "weeks")
```

```
Time difference of 14.14286 weeks
```

now() and today()

```
today()
```

```
"2017-10-07"
```

```
str(today())
```

```
 Date[1:1], format: "2017-10-07"
```

```
now()
```

```
"2017-10-07 09:44:52 PDT"
```

```
str(now())
```

```
 POSIXct[1:1], format: "2017-10-07 09:44:59"
```

Let's practice!

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Time spans

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Time spans in lubridate

period

- Human concept of a time span
- datetime + **period** of one day = same time on the next date
- variable length

Duration

- Stopwatch concept of a time span
- datetime + **duration** of one day = datetime + 86400 seconds
- fixed number of seconds

Creating a time span

```
days()
```

```
"1d 0H 0M 0S"
```

```
days(x = 2)
```

```
"2d 0H 0M 0S"
```

```
ddays(2)
```

```
"172800s (~2 days)"
```

Arithmetic with time spans

```
2 * days()
```

```
"2d 0H 0M 0S"
```

```
days() + days()
```

```
"2d 0H 0M 0S"
```

```
ymd("2011-01-01") + days()
```

```
"2011-01-02"
```

Functions to create time spans

Time span	Duration	Period
Seconds	`dseconds()`	`seconds()`
Minutes	`dminutes()`	`minutes()`
Hours	`dhours()`	`hours()`
Days	`ddays()`	`days()`
Weeks	`dweeks()`	`weeks()`
Months	-	`months()`
Years	`dyears()`	`years()`

Let's practice!

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Intervals

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Creating intervals

`datetime1` %--% `datetime2`, or

`interval(datetime1, datetime2)`

```
dmy("5 January 1961") %--% dmy("30 January 1969")
```

```
1961-01-05 UTC--1969-01-30 UTC
```

```
interval(dmy("5 January 1961"), dmy("30 January 1969"))
```

```
1961-01-05 UTC--1969-01-30 UTC
```

Operating on an interval

```
beatles <- dmy("5 January 1961") %--% dmy("30 January 1969")
int_start(beatles)
```

```
"1961-01-05 UTC"
```

```
int_end(beatles)
```

```
"1969-01-30 UTC"
```

Operating on an interval

```
int_length(beatles)
```

```
254620800
```

```
as.period(beatles)
```

```
"8y 0m 25d 0H 0M 0S"
```

```
as.duration(beatles)
```

```
"254620800s (~8.07 years)"
```

Comparing intervals

```r
hendrix_at_woodstock <- mdy("August 17 1969")
```

```r
hendrix_at_woodstock %within% beatles
```

```
FALSE
```

```r
hendrix <- dmy("01 October 1966") %--% dmy("16 September 1970")
```

```r
int_overlaps(beatles, hendrix)
```

```
TRUE
```

Which kind of time span?

Use:

- **Intervals** when you have a *start* and *end*
- **Periods** when you are interested in human units
- **Durations** if you are interested in seconds elapsed

Monarchs of England

Monarchs of Britain

```
monarchs
```

```
# A tibble: 131 x 4
                              name       from         to       dominion
                             <chr>     <dttm>     <dttm>          <chr>
 1                    Elizabeth II 1952-02-06 2017-10-07 United Kingdom
 2                        Victoria 1837-06-20 1901-01-22 United Kingdom
 3                        George V 1910-05-06 1936-01-20 United Kingdom
 4                      George III 1801-01-01 1820-01-29 United Kingdom
# ... with 127 more rows
```

Halley's comet

Halley's comet:

https://en.wikipedia.org/wiki/Halley%27s_Comet#Apparitions

```
halleys
```

```
# A tibble: 27 x 6
      designation  year perihelion_date start_date   end_date distance
            <chr> <int>          <date>     <date>     <date>    <chr>
 1   1P/66 B1, 66    66      0066-01-26 0066-01-25 0066-01-26     <NA>
 2 1P/141 F1, 141   141      0141-03-25 0141-03-22 0141-03-25     <NA>
 3 1P/218 H1, 218   218      0218-04-06 0218-04-06 0218-05-17     <NA>
 4 1P/295 J1, 295   295      0295-04-07 0295-04-07 0295-04-20     <NA>
# ... with 23 more rows
```

Let's practice!

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