

User heaven

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1 Introduction

The most important philosophy of **heaven** is to change objects by reference in order to avoid copying large amounts of data around. This vignette aims to gently help noobs onto beginner level.

1.1 Load library

```
library(heaven)
```

Loading required package: data.table

data.table 1.9.6 For help type ?data.table or <https://github.com/Rdatatable/data.table/wiki>

The fastest way to learn (by data.table authors): <https://www.datacamp.com/courses/data-analysis-with-data-table>

Loading required package: ggplot2

Loading required package: gridExtra

Loading required package: scales

LOL: This is heaven! Version 0.0.3

A good place to get started is `vignette('user-heaven')`.

1.2 Sample data

1.2.1 Drug claims data

```
set.seed(05021992)
N=5
lmdb <- simPrescriptionData(N)
lmdb
```

1.2.2 Hospital admission data

```
hospdb <- simAdmissionData(N)
hospdb
```

2 Medicin macro

2.1 A talkative preprocessing object

2.1.1 Empty object

```
d <- dpp()
d
```

Data preprocessing structure

NOTE: No treatments have been specified yet

NOTE: Drug data still missing, add as follows:

```
drugdb(object) <- claim.data
```

NOTE: Admission dates data still missing, add as follows:

```
admdb(object) <- hospital.data
```

2.1.2 Adding the drug claims data base

```
drugdb(d) <- lmdb
d
```

Data preprocessing structure

NOTE: No treatments have been specified yet

NOTE: Admission dates data still missing, add as follows:

```
admdb(object) <- hospital.data
```

2.1.3 Adding the hospital admission data base

```
admdb(d) <- hospdb
d
```

Data preprocessing structure

NOTE: No treatments have been specified yet

2.1.4 Specifying the drugs

```

drug(d, "Diafoxamin") <- atc("A07")
drug(d, "Diafoxamin") <- pack(c(200, 400, 500),
                             min = c(100, 200, 250),
                             max = c(300, 800, 1000),
                             def = c(200, 400, 500))

drug(d, "Kalium") <- atc("A12B")
drug(d, "Kalium") <- pack(c(75,750),
                         min = c(75,750),
                         max = c(75,750),
                         def = c(75,750))

d

```

Data preprocessing structure

Registered the following treatment(s):

Diafoxamin: A07

Kalium: A12B

Dose values to be used in calculations:

| | value | min | max | def |
|--------------|-------|-----|------|-----|
| Diafoxamin.1 | 200 | 100 | 300 | 200 |
| Diafoxamin.2 | 400 | 200 | 800 | 400 |
| Diafoxamin.3 | 500 | 250 | 1000 | 500 |
| Kalium.1 | 75 | 75 | 75 | 75 |
| Kalium.2 | 750 | 750 | 750 | 750 |

NOTE: Use "pwindow<-" to specify N

NOTE: Use "maxdepot<-" to specify maximum depot from one prescription to the next

NOTE: Use "period<-" to specify relevant period of time

You may now use the function 'process<-' to estimate prescription lengths and average doses of drugs:

Diafoxamin

Kalium

2.1.5 Fine-tuning parameters (maxdepot, period, window)

```

maxdepot(d) <- 4000
pwindow(d) <- 2
period(d) <- as.Date(c("1997-01-01", "2012-12-31"))

d

```

Data preprocessing structure

Registered the following treatment(s):

Diafoxamin: A07

Kalium: A12B

Dose values to be used in calculations:

| | value | min | max | def |
|--------------|-------|-----|------|-----|
| Diafoxamin.1 | 200 | 100 | 300 | 200 |
| Diafoxamin.2 | 400 | 200 | 800 | 400 |
| Diafoxamin.3 | 500 | 250 | 1000 | 500 |
| Kalium.1 | 75 | 75 | 75 | 75 |
| Kalium.2 | 750 | 750 | 750 | 750 |

| | N | maxdepot | period_start | period_end |
|------------|---|----------|--------------|------------|
| Diafoxamin | 2 | 4000 | 1997-01-01 | 2012-12-31 |
| Kalium | 2 | 4000 | 1997-01-01 | 2012-12-31 |

You may now use the function 'process<-' to estimate prescription lengths and average doses of drugs:

Diafoxamin

Kalium

2.2 Processing the object

2.2.1 First Diafoxamin

```
process(d) <- "Diafoxamin"  
d
```

Data preprocessing structure

Registered the following treatment(s):

Diafoxamin: A07

Kalium: A12B

Dose values to be used in calculations:

| | value | min | max | def |
|--------------|-------|-----|------|-----|
| Diafoxamin.1 | 200 | 100 | 300 | 200 |
| Diafoxamin.2 | 400 | 200 | 800 | 400 |
| Diafoxamin.3 | 500 | 250 | 1000 | 500 |
| Kalium.1 | 75 | 75 | 75 | 75 |

Kalium.2 750 750 750 750

| | N | maxdepot | period_start | period_end |
|------------|---|----------|--------------|------------|
| Diafoxamin | 2 | 4000 | 1997-01-01 | 2012-12-31 |
| Kalium | 2 | 4000 | 1997-01-01 | 2012-12-31 |

Processed drugs

Diafoxamin:

| | id | X | B | E |
|-----|----|------|------------|------------|
| 1: | 1 | 500 | 1997-09-30 | 1997-11-11 |
| 2: | 1 | 0 | 1998-02-14 | 1998-03-08 |
| 3: | 1 | 1000 | 1997-11-12 | 1998-02-13 |
| 4: | 1 | 800 | 1998-03-09 | 1998-04-08 |
| 5: | 2 | 500 | 1997-01-15 | 1997-03-05 |
| 6: | 2 | 300 | 1997-03-06 | 1997-04-27 |
| 7: | 3 | 400 | 1997-04-06 | 1997-05-21 |
| 8: | 3 | 1000 | 1997-05-22 | 1997-05-23 |
| 9: | 3 | 300 | 1997-05-24 | 1997-08-17 |
| 10: | 3 | 1000 | 1997-08-18 | 1997-10-31 |
| 11: | 3 | 300 | 1997-11-01 | 1998-03-02 |
| 12: | 3 | 0 | 1998-06-06 | 1998-09-16 |
| 13: | 3 | 800 | 1998-03-03 | 1998-06-05 |
| 14: | 3 | 500 | 1998-09-17 | 1998-12-03 |
| 15: | 3 | 0 | 1999-03-18 | 1999-04-19 |
| 16: | 3 | 1000 | 1998-12-04 | 1999-03-17 |
| 17: | 3 | 1000 | 1999-04-20 | 1999-05-20 |
| 18: | 4 | 200 | 1997-12-24 | 1998-02-19 |
| 19: | 4 | 800 | 1998-02-20 | 1998-03-25 |
| 20: | 4 | 0 | 1998-06-14 | 1999-05-18 |
| 21: | 4 | 300 | 1998-03-26 | 1998-06-13 |
| 22: | 4 | 200 | 1999-05-19 | 1999-07-23 |
| 23: | 4 | 400 | 1999-07-24 | 1999-08-17 |
| 24: | 4 | 800 | 1999-08-18 | 1999-08-21 |
| 25: | 4 | 300 | 1999-08-22 | 1999-12-27 |
| 26: | 4 | 800 | 1999-12-28 | 2000-04-10 |
| 27: | 5 | 0 | 1997-04-12 | 1998-11-09 |
| 28: | 5 | 400 | 1997-02-11 | 1997-04-11 |
| 29: | 5 | 0 | 1999-02-18 | 1999-03-06 |
| 30: | 5 | 200 | 1998-11-10 | 1999-02-17 |
| 31: | 5 | 250 | 1999-03-07 | 1999-06-03 |
| 32: | 5 | 0 | 1999-09-12 | 1999-10-15 |
| 33: | 5 | 400 | 1999-06-04 | 1999-09-11 |
| 34: | 5 | 300 | 1999-10-16 | 2000-01-04 |

| | id | X | B | E |
|---------|----|-----|------------|------------|
| Kalium: | | | | |
| | id | X | B | E |
| 1: | 1 | 750 | 1997-08-01 | 2000-03-05 |
| 2: | 2 | 750 | 1998-06-13 | 1999-01-04 |
| 3: | 2 | 75 | 1999-01-05 | 1999-09-14 |
| 4: | 3 | 750 | 1997-01-04 | 1997-01-24 |
| 5: | 3 | 75 | 1997-01-25 | 1997-07-26 |
| 6: | 3 | 750 | 1997-07-27 | 1997-09-24 |
| 7: | 3 | 0 | 1998-06-05 | 1999-04-14 |
| 8: | 3 | 75 | 1997-09-25 | 1998-06-04 |
| 9: | 3 | 75 | 1999-04-15 | 1999-07-23 |
| 10: | 4 | 75 | 1997-09-11 | 1997-12-19 |
| 11: | 4 | 750 | 1997-12-20 | 2000-09-17 |
| 12: | 5 | 750 | 1999-03-18 | 2001-12-11 |

2.2.2 Now process Kalium

```
process(d) <- "Kalium"
d
```

Data preprocessing structure

Registered the following treatment(s):

Diafoxamin: A07

Kalium: A12B

Dose values to be used in calculations:

| | value | min | max | def |
|--------------|-------|-----|------|-----|
| Diafoxamin.1 | 200 | 100 | 300 | 200 |
| Diafoxamin.2 | 400 | 200 | 800 | 400 |
| Diafoxamin.3 | 500 | 250 | 1000 | 500 |
| Kalium.1 | 75 | 75 | 75 | 75 |
| Kalium.2 | 750 | 750 | 750 | 750 |

| | N | maxdepot | period_start | period_end |
|------------|---|----------|--------------|------------|
| Diafoxamin | 2 | 4000 | 1997-01-01 | 2012-12-31 |
| Kalium | 2 | 4000 | 1997-01-01 | 2012-12-31 |

Processed drugs

Diafoxamin:

| | id | X | B | E |
|-----|----|------|------------|------------|
| 1: | 1 | 500 | 1997-09-30 | 1997-11-11 |
| 2: | 1 | 0 | 1998-02-14 | 1998-03-08 |
| 3: | 1 | 1000 | 1997-11-12 | 1998-02-13 |
| 4: | 1 | 800 | 1998-03-09 | 1998-04-08 |
| 5: | 2 | 500 | 1997-01-15 | 1997-03-05 |
| 6: | 2 | 300 | 1997-03-06 | 1997-04-27 |
| 7: | 3 | 400 | 1997-04-06 | 1997-05-21 |
| 8: | 3 | 1000 | 1997-05-22 | 1997-05-23 |
| 9: | 3 | 300 | 1997-05-24 | 1997-08-17 |
| 10: | 3 | 1000 | 1997-08-18 | 1997-10-31 |
| 11: | 3 | 300 | 1997-11-01 | 1998-03-02 |
| 12: | 3 | 0 | 1998-06-06 | 1998-09-16 |
| 13: | 3 | 800 | 1998-03-03 | 1998-06-05 |
| 14: | 3 | 500 | 1998-09-17 | 1998-12-03 |
| 15: | 3 | 0 | 1999-03-18 | 1999-04-19 |
| 16: | 3 | 1000 | 1998-12-04 | 1999-03-17 |
| 17: | 3 | 1000 | 1999-04-20 | 1999-05-20 |
| 18: | 4 | 200 | 1997-12-24 | 1998-02-19 |
| 19: | 4 | 800 | 1998-02-20 | 1998-03-25 |
| 20: | 4 | 0 | 1998-06-14 | 1999-05-18 |
| 21: | 4 | 300 | 1998-03-26 | 1998-06-13 |
| 22: | 4 | 200 | 1999-05-19 | 1999-07-23 |
| 23: | 4 | 400 | 1999-07-24 | 1999-08-17 |
| 24: | 4 | 800 | 1999-08-18 | 1999-08-21 |
| 25: | 4 | 300 | 1999-08-22 | 1999-12-27 |
| 26: | 4 | 800 | 1999-12-28 | 2000-04-10 |
| 27: | 5 | 0 | 1997-04-12 | 1998-11-09 |
| 28: | 5 | 400 | 1997-02-11 | 1997-04-11 |
| 29: | 5 | 0 | 1999-02-18 | 1999-03-06 |
| 30: | 5 | 200 | 1998-11-10 | 1999-02-17 |
| 31: | 5 | 250 | 1999-03-07 | 1999-06-03 |
| 32: | 5 | 0 | 1999-09-12 | 1999-10-15 |
| 33: | 5 | 400 | 1999-06-04 | 1999-09-11 |
| 34: | 5 | 300 | 1999-10-16 | 2000-01-04 |
| | id | X | B | E |

Kalium:

| | id | X | B | E |
|----|----|-----|------------|------------|
| 1: | 1 | 750 | 1997-08-01 | 2000-03-05 |
| 2: | 2 | 750 | 1998-06-13 | 1999-01-04 |
| 3: | 2 | 75 | 1999-01-05 | 1999-09-14 |
| 4: | 3 | 750 | 1997-01-04 | 1997-01-24 |
| 5: | 3 | 75 | 1997-01-25 | 1997-07-26 |
| 6: | 3 | 750 | 1997-07-27 | 1997-09-24 |

| | | | | |
|-----|---|-----|------------|------------|
| 7: | 3 | 0 | 1998-06-05 | 1999-04-14 |
| 8: | 3 | 75 | 1997-09-25 | 1998-06-04 |
| 9: | 3 | 75 | 1999-04-15 | 1999-07-23 |
| 10: | 4 | 75 | 1997-09-11 | 1997-12-19 |
| 11: | 4 | 750 | 1997-12-20 | 2000-09-17 |
| 12: | 5 | 750 | 1999-03-18 | 2001-12-11 |