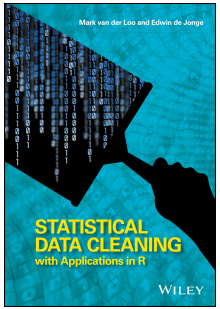

Monitoring Changes In Data

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ENBES|EESW 2019

Try the code

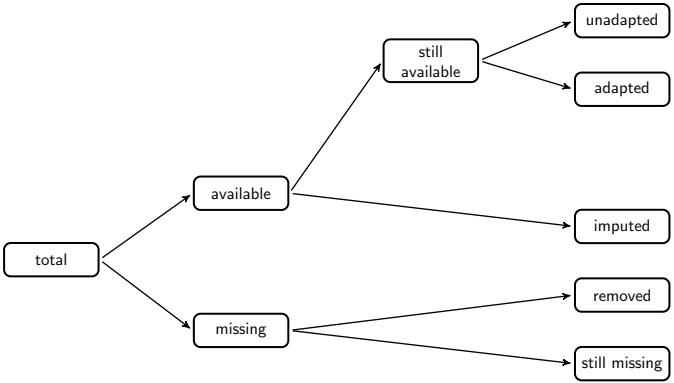
`03input/monitoring.R`

How to monitor changes

It depends . . .

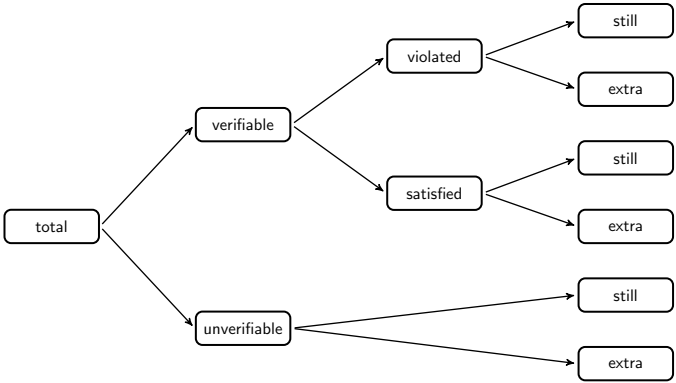
- Cell-by-cell changes?
- Count changes?
- Count changes in satisfying rules?
- Measure changes in aggregates?

Decomposing the number of changes in cells




```
validate::cells(start=dataset1, step1=dataset2, step3=dataset3, ...)
```

Decomposing the number of changes in validation results



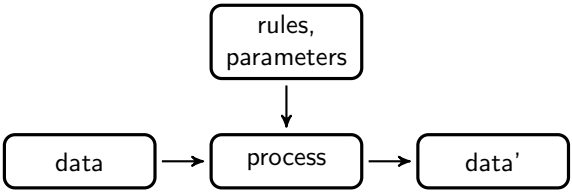

```
validate::compare(rules, start=dataset1, step1=dataset2, ...)
```

Assignment

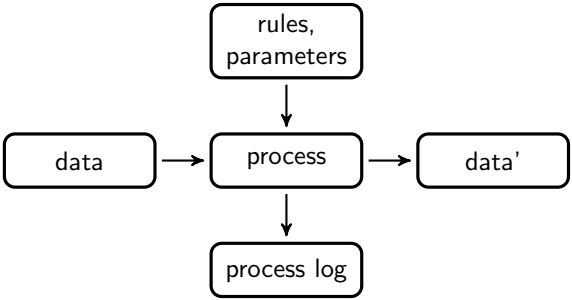
1. Read all the versions of datasets created today
2. Create plots showing the progress in the cell counts and rule counts methods.

More on monitoring

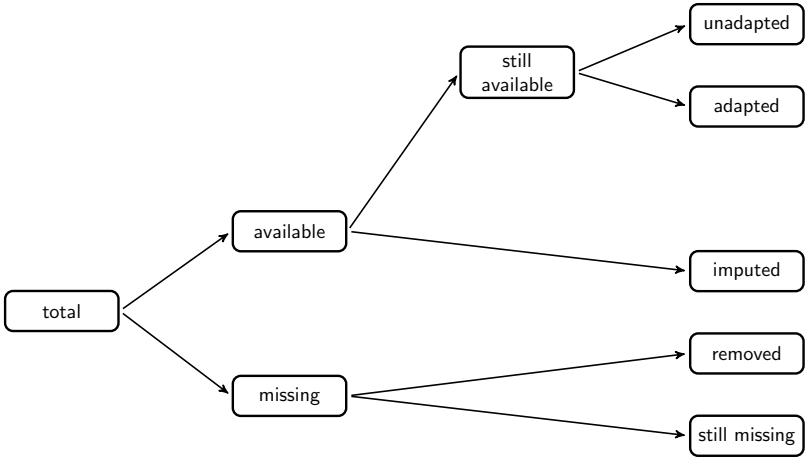
Process overview



Process overview

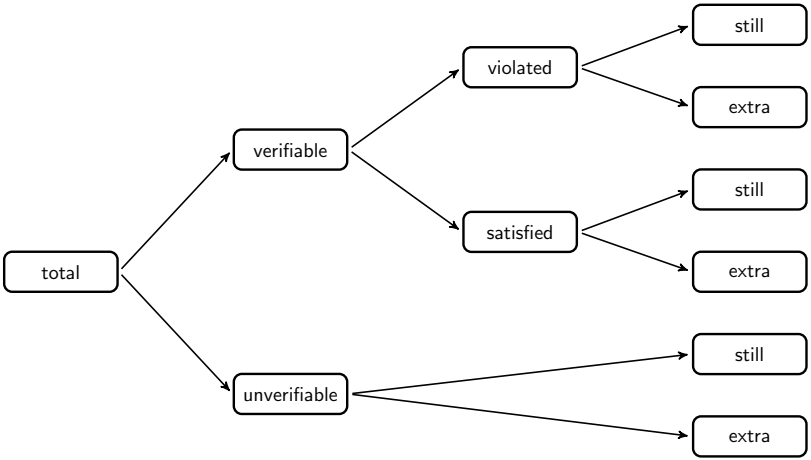


How to measure changes? 1. Track cells




```
validate::cells()
```

How to measure changes? 2. Track validations




```
validate::compare()
```

How to measure changes between `data` and `data'`?

Many ways

- List every change (record, variable, old, new) ('diff')
- Count differences in cells, or validation
- ⋮
- Note if something has changed (`TRUE`/`FALSE`)

Needs

Logging framework

- Supporting any type of comparison of `data` and `data'`
- Supporting any kind of transformation between `data` and `data'`
- Without demanding changes in the transforming functions
- That does not get in the way of the user

Logging framework

Idea

- A data cleaning procedure is implemented as a sequence of expressions (a script).
- These expressions are *composed* into a programe when you run the script (`source()`)
- To obtain a logging framework that is not intrusive for the user, we can *change the way expressions are composed*.

The lumberjack package: preparation

```
dat <- read.csv("SBS2000.csv", stringsAsFactors = FALSE)
head(dat,3)
```

```
##      id size incl.prob staff turnover other.rev total.rev staff.costs
## 1 RET01  sc0      0.02    75       NA        NA      1130          NA
## 2 RET02  sc3      0.14     9     1607        NA      1607         131
## 3 RET03  sc3      0.14    NA     6886       -33      6919         324
##   total.costs profit vat
## 1       18915  20045  NA
## 2        1544     63  NA
## 3        6493    426  NA
```

```
library(validate)
rules <- validator(.file="ruleset.R")

library(lumberjack)
logger <- cellwise$new(key="id")
```

The lumberjack package: clean up

```
dat %L>%
  lumberjack::start_log(logger) %L>%
  errorlocate::replace_errors(rules) %L>%
  rspa::tag_missing() %L>%
  simputation::impute_rhd(. ~ 1, backend="VIM") %L>%
  rspa::match_restrictions(rules) %L>%
  lumberjack::dump_log() -> dat_out
```

Read the log:

```
read.csv("cellwise.csv") %L>% head(3)
```

```
##   step                    time                          expression   key
## 1    1 2019-05-09 13:27:51 CEST errorlocate::replace_errors(rules) RET01
## 2    1 2019-05-09 13:27:51 CEST errorlocate::replace_errors(rules) RET03
## 3    1 2019-05-09 13:27:51 CEST errorlocate::replace_errors(rules) RET03
##      variable   old new
## 1      profit 20045  NA
## 2   other.rev   -33  NA
## 3 total.costs  6493  NA
```

Background

The pipe is a sort of *function composition* operator.

```
# Pseudocode:
`%>%` <- function(x, fun){
  return( fun(x) )
}
```

The `lumberjack` does some extra things:

```
# Pseudocode
%L>% <- function(x, fun){
  y <- fun(x)
  if ( logger_attached_to(x) ){
    logger <- get_logger(x)
    logger$add_difference(x,y)
  }
  return(y)
}
```

But there is more

As of `lumberjack 1.0.0`

1. Add the following line to an existing R script, e.g. `cleanup.R`

```
start_log(SBS2000, logger=cellwise$new(key="id"))
```

2. Run the file from the lumberjack package.

```
library(lumberjack)
lumberjack::run("cleanup.R")
```

and everything is done for you.