Replication validation based on reviewer comments

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Contents

Load data

We load all previously generated data, including the collected priors and the model fits for KORA and LOLIPOP.

- Number of sentinels to be processed: 551

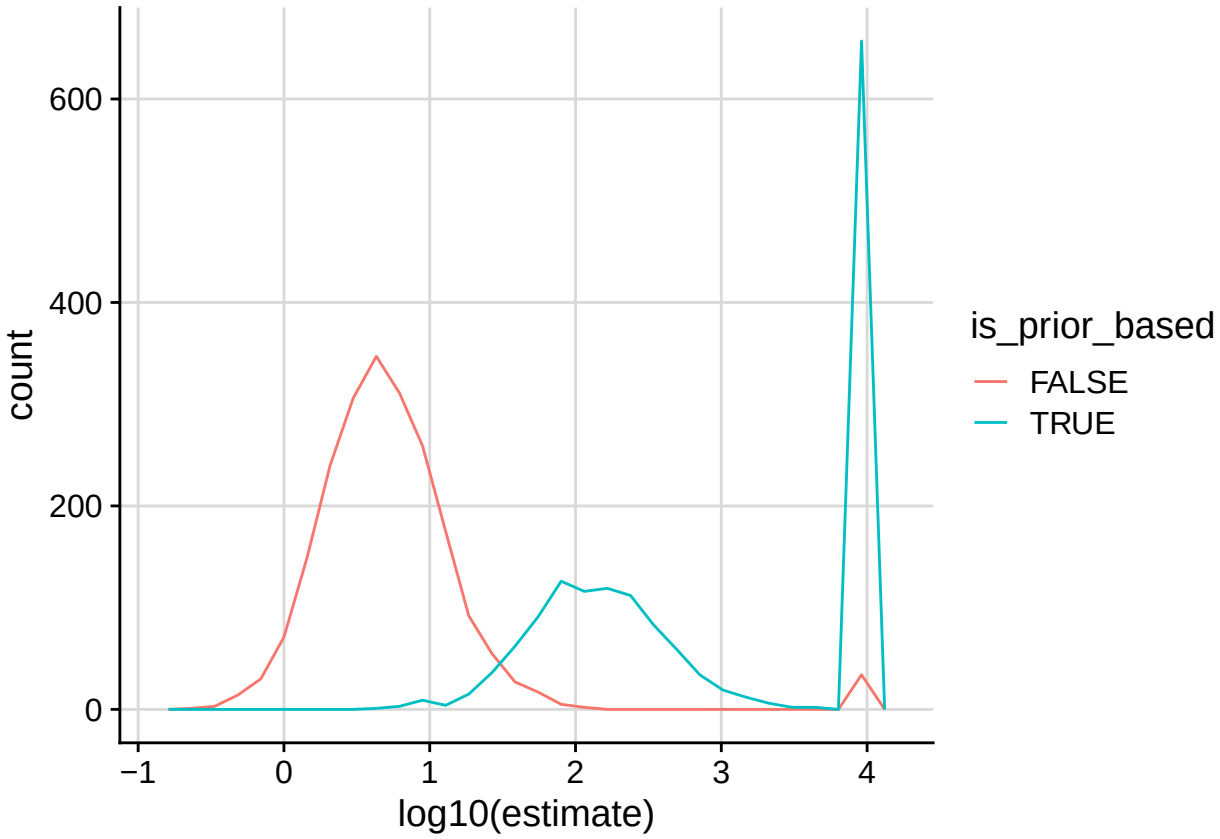
Prior importance for replication

We investigate whether available prior information largely drives replication performance. In brief, we create a contingency table from all sentinels, where we check 1) whether an edge is replicated or not and 2) whether the edge has a prior assigned it or not.

```
## # A tibble: 4,408 x 13
##    sentinel graph_model estimate  p.value conf.low conf.high method alternative
##    <chr>    <chr>          <dbl>    <dbl>    <dbl>     <dbl> <chr>  <chr>
##  1 rs10103~ bdgraph         58.8 1.79e- 8    19.5        Inf Fishe~ greater
##  2 rs10103~ bdgraph_no~      0   1.00e+ 0     0          Inf Fishe~ greater
##  3 rs10103~ bdgraph_no~      0   1.00e+ 0     0          Inf Fishe~ greater
##  4 rs10103~ irafnet          0   1.00e+ 0     0          Inf Fishe~ greater
##  5 rs10103~ genenet          0   1.00e+ 0     0          Inf Fishe~ greater
##  6 rs10103~ glasso         307.  6.46e-25   113.         Inf Fishe~ greater
##  7 rs10103~ glasso_no_~      0   1.00e+ 0     0          Inf Fishe~ greater
##  8 rs10103~ genie3           0   1.00e+ 0     0          Inf Fishe~ greater
##  9 rs10120~ bdgraph         85.6 2.27e-29    44.4        Inf Fishe~ greater
## 10 rs10120~ bdgraph_no~     10.1 2.47e- 6     4.63       Inf Fishe~ greater
## # ... with 4,398 more rows, and 5 more variables: prior_and_replicated <dbl>,
## #   prior_not_replicated <dbl>, not_prior_and_replicated <dbl>,
## #   not_prior_not_replicated <dbl>, is_prior_based <lgl>
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## Warning: Removed 702 rows containing non-finite values (stat_bin).
```

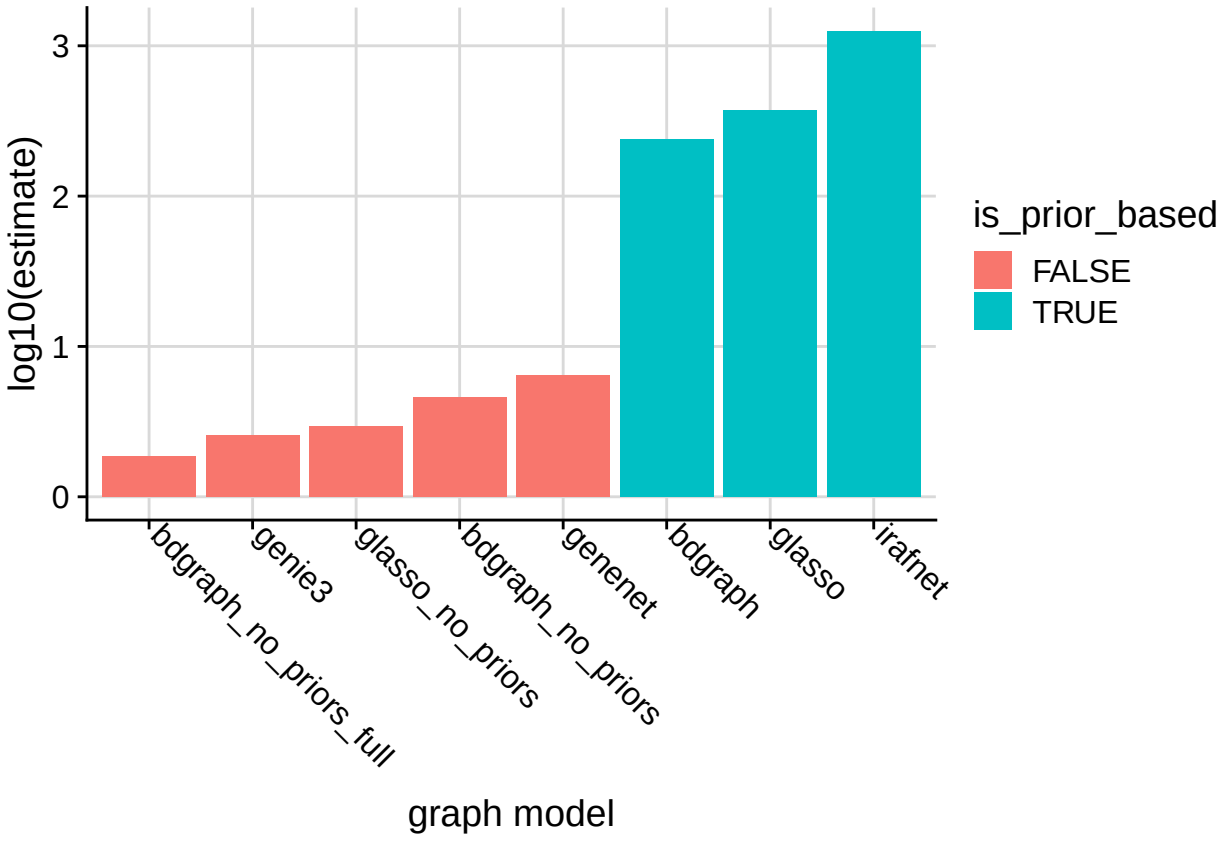


Above are the initial 'full' results, i.e. for each graph model and sentinel, we see the evaluation by use of the fisher test.

The plot indicates the distribution (log10) of estimates over all models and sentinels. `estimates` amounging to `Inf` were substituted by `10e4` and result in the peaks located at the far right of the plot.

Now we look at a simple summary, where we sum up all contingency tables and calculate a single fisher test for each of the graph models.

```
## # A tibble: 8 x 12
##   graph_model estimate p.value conf.low conf.high method alternative
##   <chr>          <dbl>   <dbl>    <dbl>     <dbl> <chr>  <chr>
## 1 bdgraph       238.         0   230.         Inf Fishe~ greater
## 2 bdgraph_no~     4.62       0     4.51       Inf Fishe~ greater
## 3 bdgraph_no~     1.87       0     1.85       Inf Fishe~ greater
## 4 genenet         6.38       0     6.04       Inf Fishe~ greater
## 5 genie3          2.58       0     2.54       Inf Fishe~ greater
## 6 glasso        373.         0   365.         Inf Fishe~ greater
## 7 glasso_no_~     2.94       0     2.87       Inf Fishe~ greater
## 8 irafnet      1257.         0  1078.         Inf Fishe~ greater
## # ... with 5 more variables: prior_and_replicated <dbl>,
## #   prior_not_replicated <dbl>, not_prior_and_replicated <dbl>,
## #   not_prior_not_replicated <dbl>, is_prior_based <lgl>
```



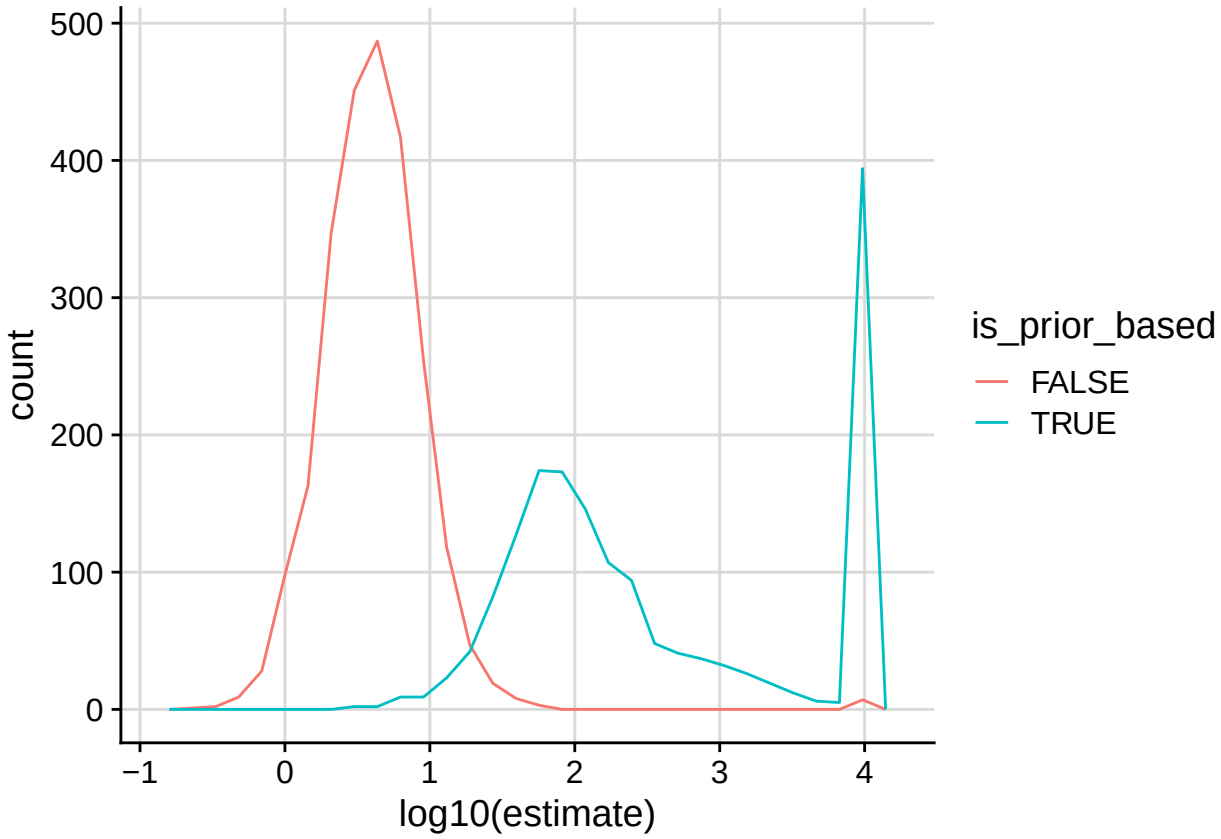
Prior importance inferred edge set

Contrary to the replicated edge set above, we can also have a look at the 'inferred' edge set, which are defined as the union of the edge sets from KORA and LOLIPOP.

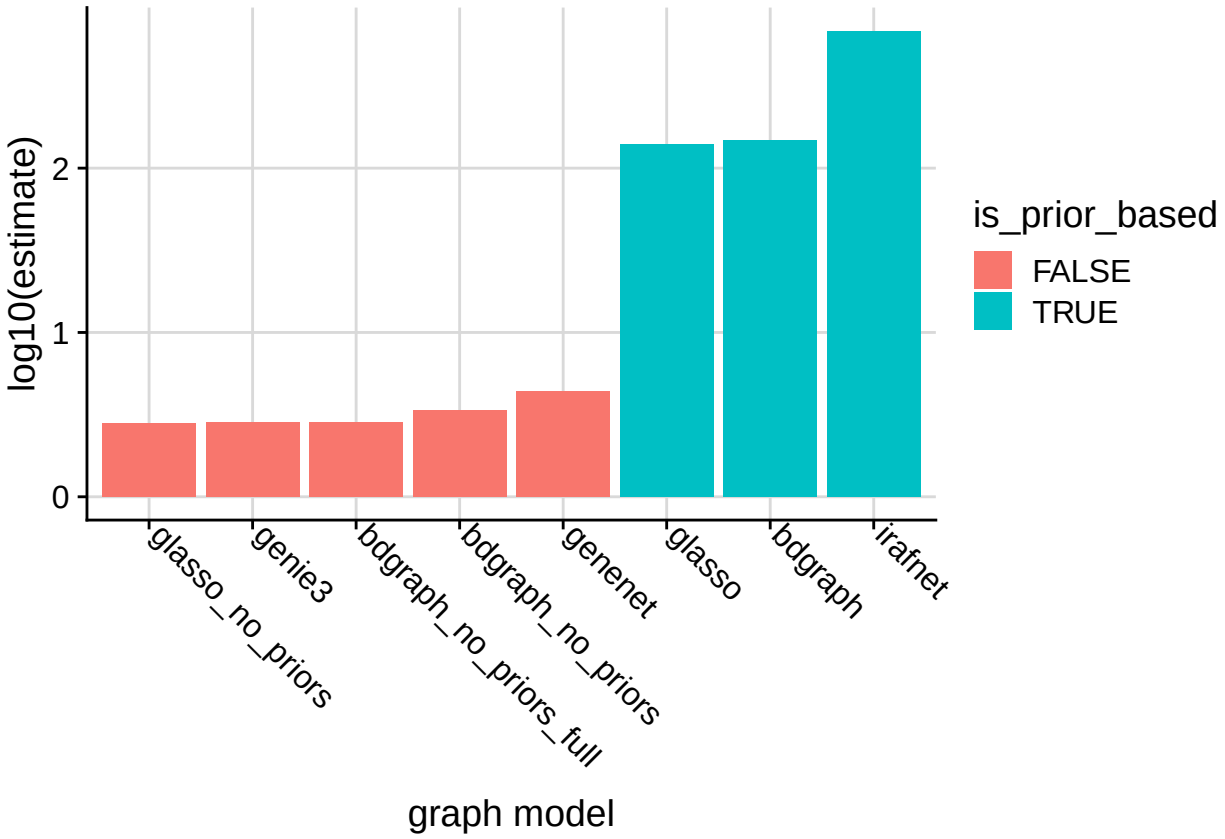
```
## # A tibble: 4,408 x 13
##    sentinel graph_model estimate  p.value conf.low conf.high method alternative
##    <chr>    <chr>          <dbl>    <dbl>    <dbl>     <dbl> <chr>  <chr>
##  1 rs10103~ bdgraph       22.9   1.24e- 8   9.55         Inf Fishe~ greater
##  2 rs10103~ bdgraph_no~    0.596 8.16e- 1   0.0290       Inf Fishe~ greater
##  3 rs10103~ bdgraph_no~    0.620 8.04e- 1   0.0301       Inf Fishe~ greater
##  4 rs10103~ irafnet       46.7   1.83e- 3   5.95         Inf Fishe~ greater
##  5 rs10103~ genenet        1.43  5.17e- 1   0.0690       Inf Fishe~ greater
##  6 rs10103~ glasso       208.    2.06e-24  67.9          Inf Fishe~ greater
##  7 rs10103~ glasso_no_~    0     1.00e+ 0   0            Inf Fishe~ greater
##  8 rs10103~ genie3         0     1.00e+ 0   0            Inf Fishe~ greater
##  9 rs10120~ bdgraph      119.    2.61e-46  62.6          Inf Fishe~ greater
## 10 rs10120~ bdgraph_no~   15.4   3.31e-17   9.07         Inf Fishe~ greater
## # ... with 4,398 more rows, and 5 more variables: prior_and_inferred <dbl>,
## #   prior_not_inferred <dbl>, not_prior_and_inferred <dbl>,
## #   not_prior_not_inferred <dbl>, is_prior_based <lgl>
```

```
## `stat_bin()` using `bins = 30`. Pick better value with `binwidth`.
```

```
## Warning: Removed 339 rows containing non-finite values (stat_bin).
```




```
## # A tibble: 8 x 12
##   graph_model estimate p.value conf.low conf.high method alternative
##   <chr>          <dbl>   <dbl>    <dbl>     <dbl> <chr>  <chr>
## 1 bdgraph       148.          0   146.         Inf Fishe~ greater
## 2 bdgraph_no~     3.37        0     3.33       Inf Fishe~ greater
## 3 bdgraph_no~     2.83        0     2.80       Inf Fishe~ greater
## 4 genenet         4.39        0     4.26       Inf Fishe~ greater
## 5 genie3          2.82        0     2.80       Inf Fishe~ greater
## 6 glasso        139.          0   136.         Inf Fishe~ greater
## 7 glasso_no_~     2.79        0     2.76       Inf Fishe~ greater
## 8 irafnet       685.          0   646.         Inf Fishe~ greater
## # ... with 5 more variables: prior_and_inferred <dbl>,
## #   prior_not_inferred <dbl>, not_prior_and_inferred <dbl>,
## #   not_prior_not_inferred <dbl>, is_prior_based <lgl>
```



Session Info

```
## - Session info ---------------------------------------------------------------
##  setting  value
##  version  R version 3.6.1 (2019-07-05)
##  os       Debian GNU/Linux 9 (stretch)
##  system   x86_64, linux-gnu
##  ui       X11
##  language (EN)
##  collate  en_US.UTF-8
##  ctype    en_US.UTF-8
##  tz       Etc/UTC
##  date     2021-03-24
##
## - Packages -------------------------------------------------------------------
##  package      * version date       lib source
##  assertthat     0.2.1   2019-03-21 [1] CRAN (R 3.6.1)
##  backports      1.1.5   2019-10-02 [1] CRAN (R 3.6.1)
##  BDgraph      * 2.62    2019-12-05 [1] CRAN (R 3.6.1)
##  BiocGenerics * 0.32.0  2019-10-29 [1] Bioconductor
##  broom          0.5.2   2019-04-07 [1] CRAN (R 3.6.1)
##  callr          3.3.2   2019-09-22 [1] CRAN (R 3.6.1)
##  cli            1.1.0   2019-03-19 [1] CRAN (R 3.6.1)
##  colorspace     1.4-1   2019-03-18 [1] CRAN (R 3.6.1)
##  cowplot      * 1.0.0   2019-07-11 [1] CRAN (R 3.6.1)
##  crayon         1.3.4   2017-09-16 [1] CRAN (R 3.6.1)
```

```
##  desc           1.2.0   2018-05-01 [1] CRAN (R 3.6.1)
##  devtools       2.2.1   2019-09-24 [1] CRAN (R 3.6.1)
##  digest         0.6.23  2019-11-23 [1] CRAN (R 3.6.1)
##  dplyr        * 0.8.3   2019-07-04 [1] CRAN (R 3.6.1)
##  ellipsis       0.3.0   2019-09-20 [1] CRAN (R 3.6.1)
##  evaluate       0.14    2019-05-28 [1] CRAN (R 3.6.1)
##  fansi          0.4.0   2018-10-05 [1] CRAN (R 3.6.1)
##  farver         2.0.1   2019-11-13 [1] CRAN (R 3.6.1)
##  fs             1.3.1   2019-05-06 [1] CRAN (R 3.6.1)
##  generics       0.0.2   2018-11-29 [1] CRAN (R 3.6.1)
##  ggplot2      * 3.2.1   2019-08-10 [1] CRAN (R 3.6.1)
##  glue           1.3.1   2019-03-12 [1] CRAN (R 3.6.1)
##  graph        * 1.64.0  2019-10-29 [1] Bioconductor
##  gtable         0.3.0   2019-03-25 [1] CRAN (R 3.6.1)
##  hms            0.5.2   2019-10-30 [1] CRAN (R 3.6.1)
##  htmltools      0.4.0   2019-10-04 [1] CRAN (R 3.6.1)
##  igraph       * 1.2.4.2 2019-11-27 [1] CRAN (R 3.6.1)
##  knitr          1.26    2019-11-12 [1] CRAN (R 3.6.1)
##  labeling       0.3     2014-08-23 [1] CRAN (R 3.6.1)
##  lattice        0.20-38 2018-11-04 [2] CRAN (R 3.6.1)
##  lazyeval       0.2.2   2019-03-15 [1] CRAN (R 3.6.1)
##  lifecycle      0.1.0   2019-08-01 [1] CRAN (R 3.6.1)
##  magrittr       1.5     2014-11-22 [1] CRAN (R 3.6.1)
##  memoise        1.1.0   2017-04-21 [1] CRAN (R 3.6.1)
##  munsell        0.5.0   2018-06-12 [1] CRAN (R 3.6.1)
##  nlme           3.1-140 2019-05-12 [2] CRAN (R 3.6.1)
##  pillar         1.4.2   2019-06-29 [1] CRAN (R 3.6.1)
##  pkgbuild       1.0.6   2019-10-09 [1] CRAN (R 3.6.1)
##  pkgconfig      2.0.3   2019-09-22 [1] CRAN (R 3.6.1)
##  pkgload        1.0.2   2018-10-29 [1] CRAN (R 3.6.1)
##  plyr           1.8.4   2016-06-08 [1] CRAN (R 3.6.1)
##  prettyunits    1.0.2   2015-07-13 [1] CRAN (R 3.6.1)
##  processx       3.4.1   2019-07-18 [1] CRAN (R 3.6.1)
##  ps             1.3.0   2018-12-21 [1] CRAN (R 3.6.1)
##  purrr          0.3.3   2019-10-18 [1] CRAN (R 3.6.1)
##  R6             2.4.1   2019-11-12 [1] CRAN (R 3.6.1)
##  Rcpp           1.0.3   2019-11-08 [1] CRAN (R 3.6.1)
##  readr        * 1.3.1   2018-12-21 [1] CRAN (R 3.6.1)
##  remotes        2.1.0   2019-06-24 [1] CRAN (R 3.6.1)
##  reshape2     * 1.4.3   2017-12-11 [1] CRAN (R 3.6.1)
##  rlang          0.4.2   2019-11-23 [1] CRAN (R 3.6.1)
##  rmarkdown      1.17    2019-11-13 [1] CRAN (R 3.6.1)
##  rprojroot      1.3-2   2018-01-03 [1] CRAN (R 3.6.1)
##  scales         1.1.0   2019-11-18 [1] CRAN (R 3.6.1)
##  sessioninfo    1.1.1   2018-11-05 [1] CRAN (R 3.6.1)
##  stringi        1.4.3   2019-03-12 [1] CRAN (R 3.6.1)
##  stringr        1.4.0   2019-02-10 [1] CRAN (R 3.6.1)
##  testthat       2.3.0   2019-11-05 [1] CRAN (R 3.6.1)
##  tibble         2.1.3   2019-06-06 [1] CRAN (R 3.6.1)
##  tidyr          1.0.0   2019-09-11 [1] CRAN (R 3.6.1)
##  tidyselect     0.2.5   2018-10-11 [1] CRAN (R 3.6.1)
##  usethis        1.5.1   2019-07-04 [1] CRAN (R 3.6.1)
##  utf8           1.1.4   2018-05-24 [1] CRAN (R 3.6.1)
##  vctrs          0.2.0   2019-07-05 [1] CRAN (R 3.6.1)
```

```
##  withr          2.1.2   2018-03-15 [1] CRAN (R 3.6.1)
##  xfun           0.11    2019-11-12 [1] CRAN (R 3.6.1)
##  yaml           2.2.0   2018-07-25 [1] CRAN (R 3.6.1)
##  zeallot        0.1.0   2018-01-28 [1] CRAN (R 3.6.1)
##
## [1] /usr/local/lib/R/site-library
## [2] /usr/local/lib/R/library
```