Growth rates of PIT data from the Delaware River

Ben Letcher

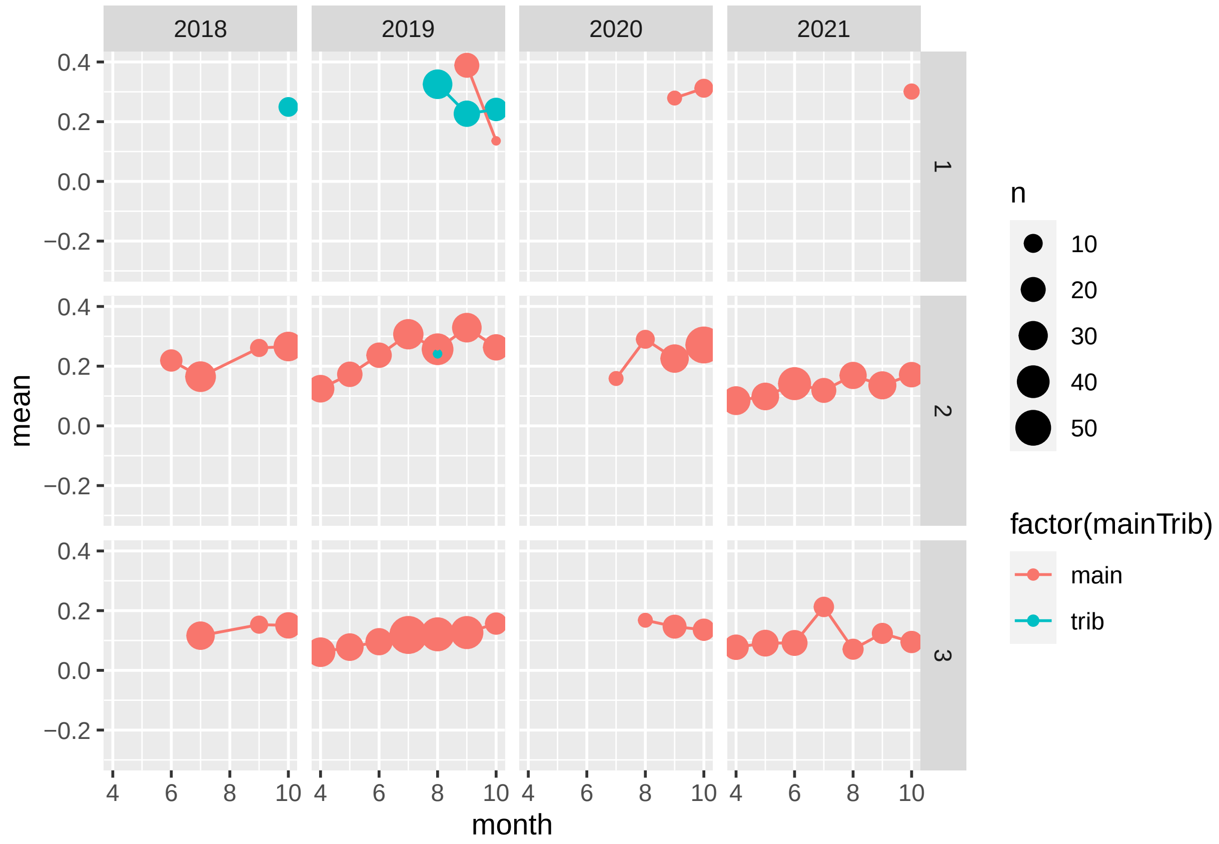
2023-01-27

```
d <- tar_read(target_d)
eh <- tar_read(target_eh)
```

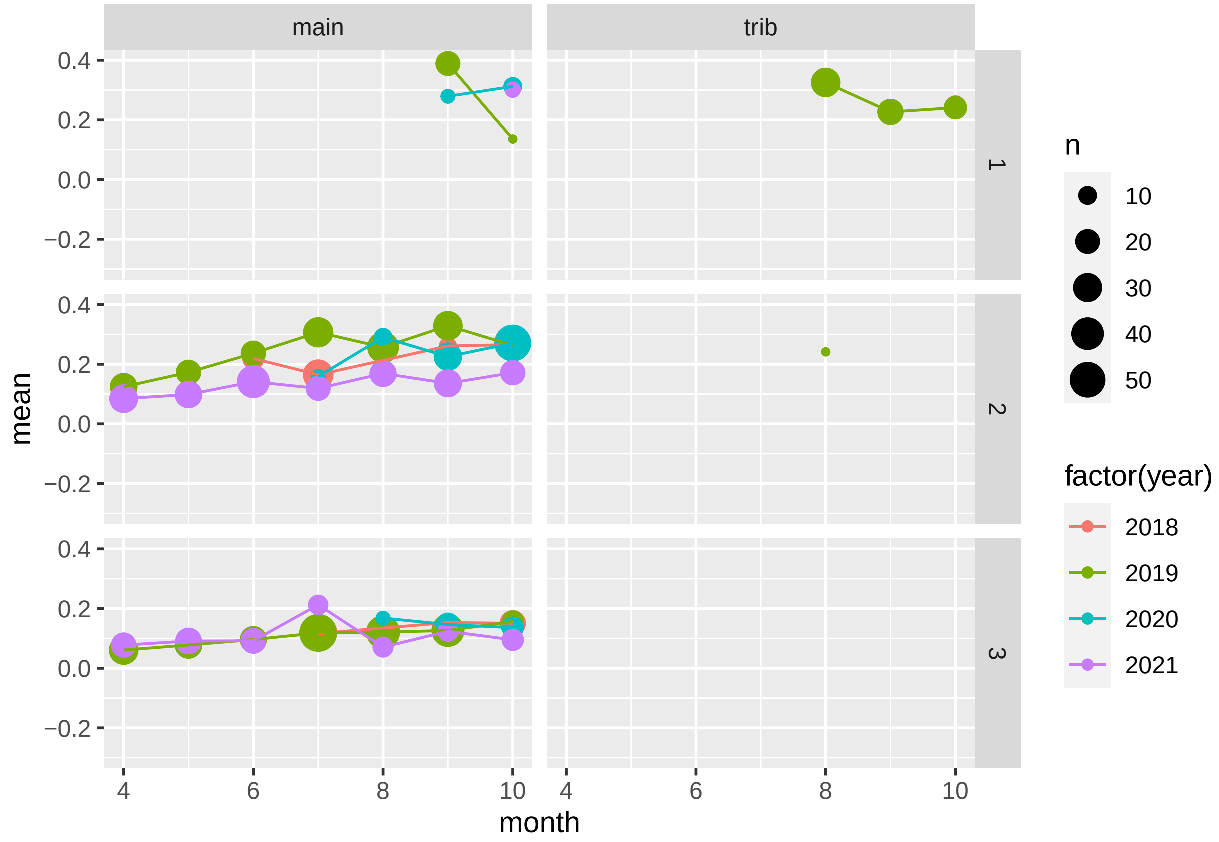
Add growth rate

```
d <- d %>%
  mutate(year = as.numeric(substr(dateYM, 1,4)),
         month = as.numeric(substr(dateYM, 6,7)))

d <- d %>%
  group_by(tag) %>%
  arrange(tag, date) %>%
  mutate(LengthLag = lag(Length),
         dateLag = lag(date),
         dateDiff = as.numeric(date - dateLag),
         growth = (Length - LengthLag) / dateDiff)
```

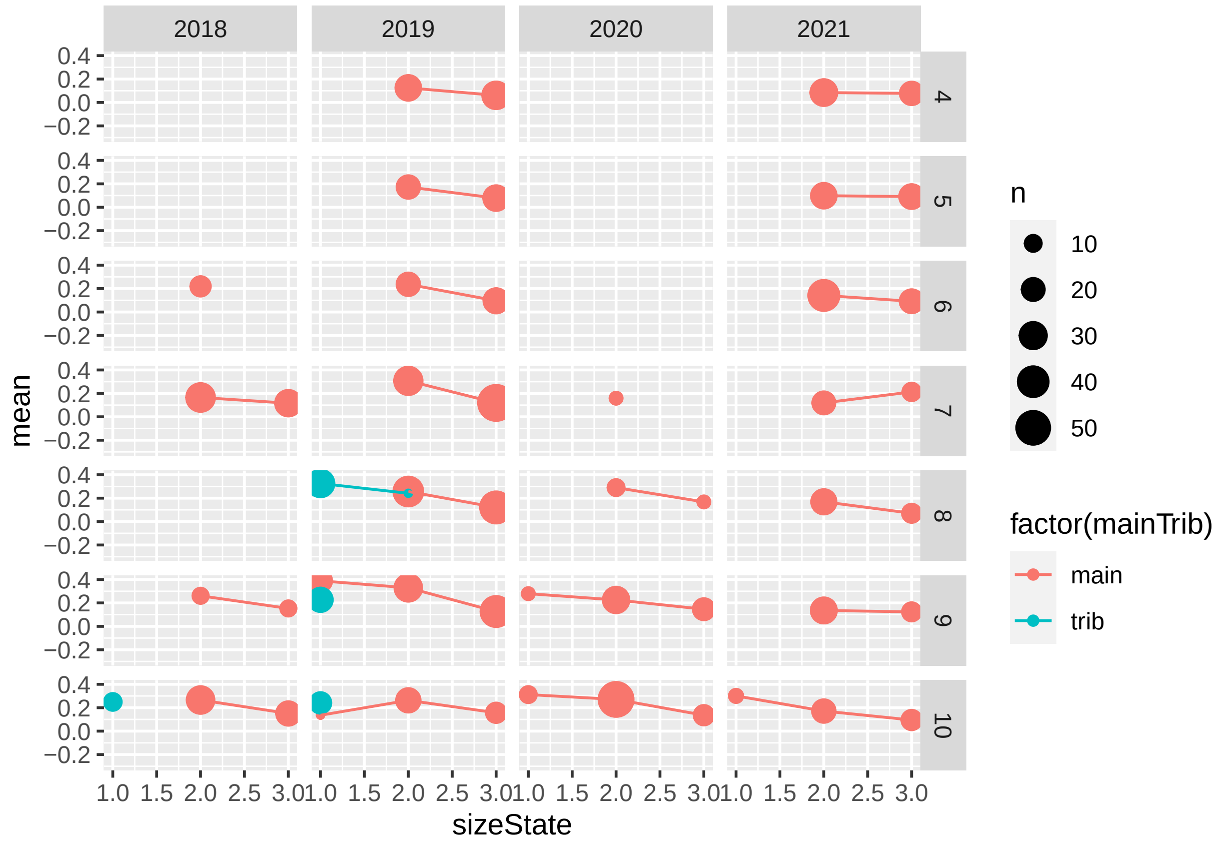
```
meanGrowth <- d %>%
  filter(dateDiff < 300, growth > 0, growth < 3) %>%
  group_by(mainTrib, year, month, sizeState) %>%
  summarise(mean = mean(growth, na.rm = TRUE),
            n = n()) %>%
  filter(n > 3)
#> `summarise()` has grouped output by 'mainTrib', 'year', 'month'. You can
#> override using the `.groups` argument.

ggplot(meanGrowth, aes(month, mean, color = factor(mainTrib))) +
  geom_point(aes(size = n)) +
  geom_line() +
  ylim(-0.3, 0.4) +
  facet_grid(sizeState ~ year)
#> Warning: Removed 3 rows containing missing values (geom_point).
#> Warning: Removed 3 row(s) containing missing values (geom_path).
#> geom_path: Each group consists of only one observation. Do you need to adjust
#> the group aesthetic?
#> geom_path: Each group consists of only one observation. Do you need to adjust
#> the group aesthetic?
```



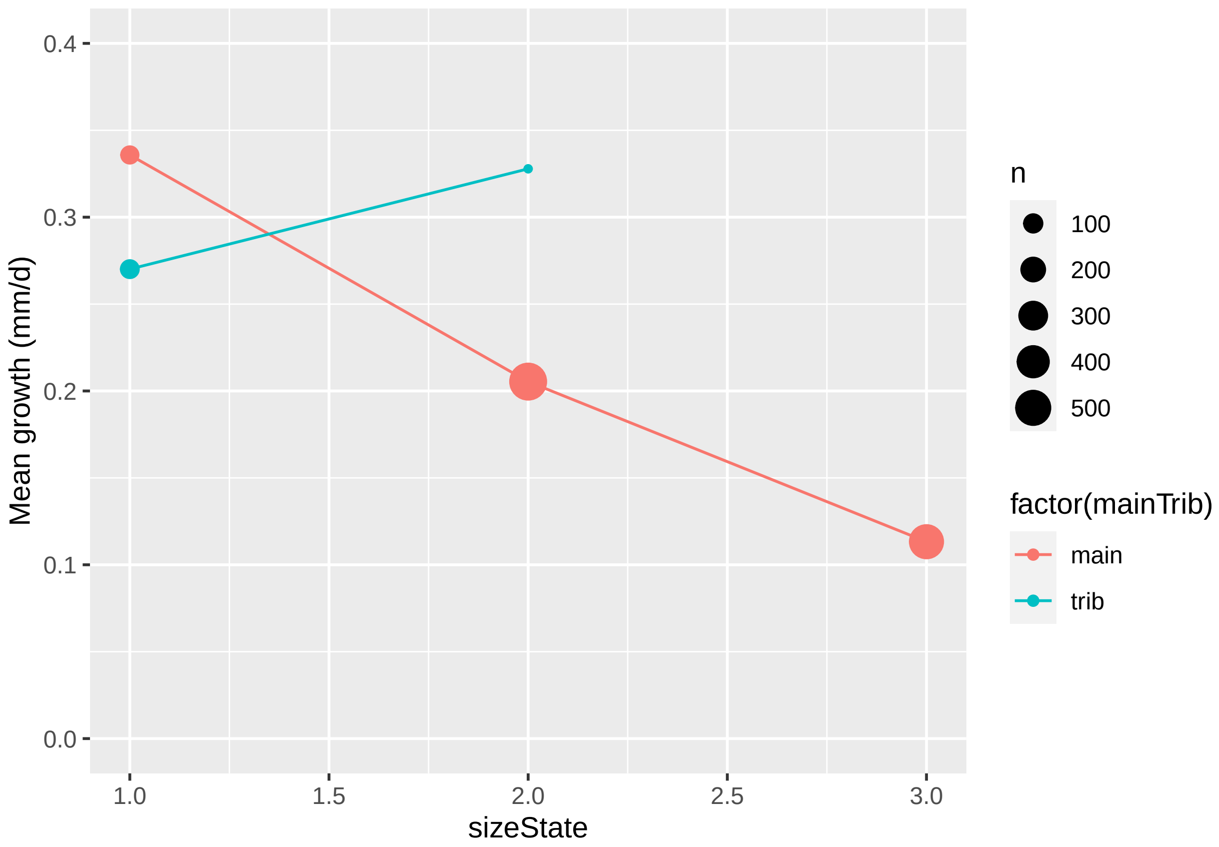
```
ggplot(meanGrowth, aes(month, mean, color = factor(year))) +
  geom_point(aes(size = n)) +
  geom_line() +
  ylim(-0.3, 0.4) +
  facet_grid(sizeState ~ mainTrib)
#> Warning: Removed 3 rows containing missing values (geom_point).
#> Warning: Removed 2 row(s) containing missing values (geom_path).
```



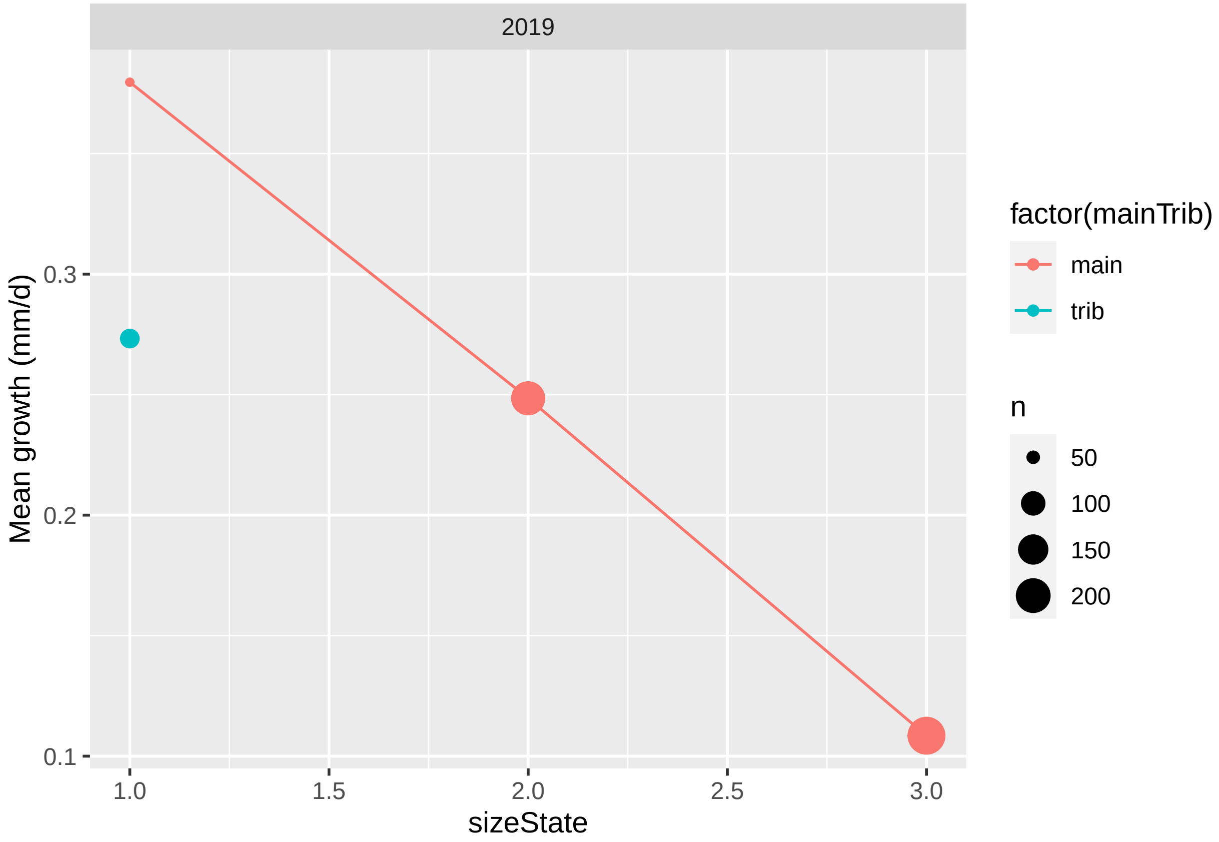
```
ggplot(meanGrowth, aes(sizeState, mean, color = factor(mainTrib))) +
  geom_point(aes(size = n)) +
  geom_line() +
  ylim(-0.3, 0.4) +
  facet_grid(month ~ year)
#> Warning: Removed 3 rows containing missing values (geom_point).
#> geom_path: Each group consists of only one observation. Do you need to adjust
#> the group aesthetic?
#> geom_path: Each group consists of only one observation. Do you need to adjust
#> the group aesthetic?
```



```
meanGrowthSize <- d %>%
  filter(dateDiff < 300, growth > 0, growth < 3) %>%
  group_by(mainTrib, sizeState) %>%
  summarise(mean = mean(growth, na.rm = TRUE),
            sd = sd(growth, na.rm = TRUE),
            n = n()) %>%
  filter(n > 5)
#> `summarise()` has grouped output by 'mainTrib'. You can override using the
#> `.groups` argument.


ggplot(meanGrowthSize, aes(sizeState, mean, color = factor(mainTrib))) +
  geom_point(aes(size = n)) +
  ylab("Mean growth (mm/d)") +
  ylim(0, 0.4) +
  geom_line()
```



```
meanGrowthSizeYear <- d %>%
  filter(dateDiff < 300, growth > 0, growth < 3) %>%
  group_by(mainTrib, sizeState, year) %>%
  summarise(mean = mean(growth, na.rm = TRUE),
            sd = sd(growth, na.rm = TRUE),
            n = n()) %>%
  filter(n > 5)
#> `summarise()` has grouped output by 'mainTrib', 'sizeState'. You can override
#> using the `.groups` argument.



ggplot(meanGrowthSizeYear %>% filter(year == 2019, n > 20), aes(sizeState, mean, color = factor(mainTril
  geom_point(aes(size = n)) +
  ylab("Mean growth (mm/d)") +
  #ylim(0, 0.4) +
  geom_line() +
  facet_wrap(~year)
```



```
tmp <- d%>% filter(year ==  2020, mainTrib == "main", sizeState == 2)
table(tmp$growth)
#> 
#>    -3.37931034482759   -1.24074074074074  -0.551724137931034  -0.333333333333333 
#>                    1                   1                   1                   1 
#>   -0.285714285714286  -0.208333333333333   -0.19047619047619             -0.1875 
#>                    1                   1                   2                   1 
#>   -0.166666666666667  -0.157894736842105  -0.121212121212121               -0.12 
#>                    1                   1                   1                   1 
#> -0.0952380952380952 -0.0833333333333333 -0.0476190476190476 -0.0357142857142857 
#>                    1                   1                   2                   1 
#>                    0 0.00699300699300699  0.0138888888888889  0.0285714285714286 
#>                    2                   1                   1                   1 
#>   0.0287141073657928  0.0303030303030303  0.0337078651685393  0.0350877192982456 
#>                    1                   1                   1                   1 
#>   0.0363128491620112  0.0383480825958702  0.0416666666666667  0.0476190476190476 
#>                    1                   1                   1                   1 
#>   0.0535714285714286  0.0606060606060606  0.0645161290322581  0.0663983903420523 
#>                    1                   1                   1                   1 
#>   0.0689655172413793  0.0695970695970696  0.0701754385964912  0.0705882352941176 
#>                    3                   1                   1                   1 
#>   0.0829145728643216  0.0833333333333333  0.0855263157894737  0.0892857142857143 
#>                    1                   2                   1                   2 
#>   0.0898876404494382  0.0909090909090909  0.0973451327433628   0.107142857142857 
#>                    1                   1                   1                   1
#>   0.112956810631229   0.114942528735632   0.117136659436009   0.121212121212121
#>                   1                   1                   1                   1
#>   0.123893805309735   0.124050632911392   0.124309392265193               0.125
#>                   1                   1                   1                   2
#>   0.129032258064516   0.131578947368421   0.132307692307692   0.135384615384615
#>                   1                   1                   1                   1
#>   0.136456211812627   0.136531365313653   0.137426900584795   0.137931034482759
#>                   1                   1                   1                   2
#>   0.140672782874618   0.141263940520446   0.142857142857143   0.143292682926829
#>                   1                   1                   1                   1
#>   0.145945945945946   0.146198830409357   0.149122807017544   0.150442477876106
#>                   1                   1                   1                   1
#>   0.151515151515152   0.152941176470588   0.154761904761905   0.155555555555556
#>                   1                   1                   1                   1
#>   0.157458563535912   0.157894736842105   0.158357771260997                0.16
#>                   1                   1                   1                   1
#>   0.160714285714286   0.160756501182033   0.161290322580645   0.163398692810458
#>                   2                   1                   1                   1
#>   0.166666666666667   0.167088607594937   0.170575692963753   0.172413793103448
#>                   1                   1                   1                   2
#>   0.175438596491228   0.178117048346056   0.178438661710037   0.178571428571429
#>                   1                   1                   1                   2
#>    0.18052738336714   0.182242990654206   0.182890855457227    0.18450184501845
#>                   1                   1                   1                   1
#>   0.187683284457478   0.191374663072776   0.194373401534527   0.194594594594595
#>                   1                   1                   1                   1
#>   0.198473282442748            0.203125   0.204545454545455   0.206896551724138
#>                   1                   1                   1                   1
#>   0.210526315789474   0.212121212121212   0.214285714285714   0.215102974828375
#>                   1                   1                   1                   1
#>   0.215189873417722   0.218954248366013   0.219941348973607   0.222222222222222
#>                   1                   1                   1                   1
#>   0.223529411764706   0.228070175438596   0.228571428571429   0.228668941979522
#>                   1                   1                   1                   1
#>   0.229281767955801   0.230088495575221    0.23155737704918   0.232142857142857
#>                   1                   1                   1                   1
#>   0.234604105571848   0.235135135135135   0.241379310344828   0.241448692152918
#>                   1                   1                   2                   1
#>   0.241635687732342   0.242424242424242                0.25   0.255372945638432
#>                   1                   2                   3                   1
#>   0.256130790190736   0.258064516129032   0.258169934640523            0.265625
#>                   1                   2                   1                   1
#>   0.267857142857143   0.270516717325228   0.272264631043257   0.272727272727273
#>                   2                   1                   1                   1
#>   0.274285714285714   0.275862068965517               0.278   0.280701754385965
#>                   1                   1                   1                   1
#>   0.281767955801105   0.283582089552239    0.28997867803838   0.290780141843972
#>                   1                   1                   1                   1
#>   0.291666666666667   0.294117647058824   0.298245614035088   0.303030303030303
#>                   1                   1                   1                   1
#>   0.310344827586207   0.321663019693654    0.32258064516129            0.328125
#>                   2                   1                   1                   1
#>   0.339285714285714   0.342857142857143   0.376470588235294   0.387096774193548
#>                   1                   1                   1                   1
#>                 0.4             0.40625   0.417366946778712   0.436781609195402
#>                   2                   1                   1                   1
#>   0.448275862068966   0.451612903225806   0.482758620689655   0.514285714285714
#>                   1                   2                   1                   1
#>   0.517241379310345   0.529411764705882             0.53125   0.586206896551724
#>                   1                   1                   1                   1
#>    1.07142857142857    2.20689655172414                  52
#>                   1                   1                   1
```