

# Bootstrap and fit mutants RLS with binomial aging model

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```
rm(list=ls())
host = "Applejack" #"Ridgeside"
if (host == "AppleJack") {
  setwd("~/github/bmc_netwk_aging_manuscript/R1/1.kaeberlein04plos")
}
if (host == "Ridgeside") {
}
```

```
library('flexsurv')
```

```
## Loading required package: survival
```

```
library('stringr')
source("../lifespan.r")
set.seed(20170701) #for repeatability
RUNS = 100; #bootstrap runs
```

```
list.files()
```

```
## [1] "0.fit.kaeberlein04.Rmd"      "092304.merged.rls.csv"
## [3] "1.bootstrap.kaeblein04.html" "1.bootstrap.kaeblein04.Rmd"
## [5] "2009"                      "bootstrap"
## [7] "sandbox"
```

## parse the strains from files

```
tb.ori = read.table("092304.merged.rls.csv", header = T, sep="\t")
summary(tb.ori)
```

```
## X031104.BY2N.RLS.tab X031104.SK1.RLS.tab X042204.KLBY4716.RLS.tab
## Min. : 6.00          Min. : 2.00          Min. : 4.00
## 1st Qu.:18.50        1st Qu.: 9.75          1st Qu.:17.75
## Median :26.00        Median :15.00          Median :30.00
## Mean :27.19          Mean :14.57           Mean :27.77
## 3rd Qu.:38.00        3rd Qu.:18.00          3rd Qu.:36.00
## Max. :44.00          Max. :32.00           Max. :47.00
## NA's :218           NA's :210             NA's :210
## X052604.sir2D.rls.tab X052604.W303.rls.tab X053104.BY4741.rls.tab
## Min. : 4.00          Min. : 4.00          Min. : 7.00
## 1st Qu.: 9.00        1st Qu.:14.00          1st Qu.:23.25
## Median :12.00        Median :17.00          Median :32.00
## Mean :12.48          Mean :17.93           Mean :32.03
## 3rd Qu.:16.00        3rd Qu.:19.75          3rd Qu.:39.00
```

## Max. :23.00	Max. :31.00	Max. :60.00	
## NA's :200	NA's :220	NA's :220	
## X053104.BY4742.rls.tab	X053104.JSBY4741.rls.tab	X061004.srp1ts.rls.tab	
## Min. : 5.0	Min. :12.00	Min. : 1.000	
## 1st Qu.:15.0	1st Qu.:27.25	1st Qu.: 4.750	
## Median :17.5	Median :35.50	Median : 7.500	
## Mean :20.9	Mean :35.40	Mean : 6.893	
## 3rd Qu.:25.0	3rd Qu.:45.00	3rd Qu.: 9.000	
## Max. :45.0	Max. :56.00	Max. :15.000	
## NA's :220	NA's :220	NA's :222	
## fig1a.BY4742	fig1a.fob1	fig1a.gpa2	fig1a.gpr1
## Min. : 4.00	Min. :11.00	Min. :15.00	Min. : 5.00
## 1st Qu.:21.00	1st Qu.:27.00	1st Qu.:26.00	1st Qu.:26.00
## Median :26.00	Median :39.00	Median :32.00	Median :32.50
## Mean :26.68	Mean :37.75	Mean :34.85	Mean :34.25
## 3rd Qu.:32.00	3rd Qu.:47.00	3rd Qu.:41.25	3rd Qu.:43.25
## Max. :57.00	Max. :72.00	Max. :63.00	Max. :62.00
## NA's :60	NA's :110	NA's :210	NA's :210
## fig1a.hxk2	fig1b.BY4742	fig1b.fob1	fig1b.hxk2
## Min. : 2.00	Min. : 4.00	Min. :11.00	Min. : 2.00
## 1st Qu.:25.00	1st Qu.:20.25	1st Qu.:27.00	1st Qu.:25.00
## Median :34.00	Median :26.00	Median :39.00	Median :34.00
## Mean :36.73	Mean :26.62	Mean :37.75	Mean :36.73
## 3rd Qu.:46.00	3rd Qu.:32.00	3rd Qu.:47.00	3rd Qu.:46.00
## Max. :71.00	Max. :57.00	Max. :72.00	Max. :71.00
## NA's :130		NA's :110	NA's :130
## fig1b.fob1.hxk2	fig1c.BY4742	fig1c.fob1	fig1c.gpa2
## Min. : 6.00	Min. : 4.00	Min. :11.00	Min. :15.00
## 1st Qu.:31.75	1st Qu.:21.00	1st Qu.:27.00	1st Qu.:26.00
## Median :49.00	Median :27.00	Median :39.00	Median :32.00
## Mean :48.28	Mean :27.21	Mean :37.75	Mean :34.85
## 3rd Qu.:63.25	3rd Qu.:33.00	3rd Qu.:47.00	3rd Qu.:41.25
## Max. :96.00	Max. :57.00	Max. :72.00	Max. :63.00
## NA's :90	NA's :20	NA's :110	NA's :210
## fig1c.fob1.gpa2	fig2a.BY4742	fig2a.sir2	fig2a.hxk2.sir2
## Min. :10.00	Min. : 7.00	Min. : 5.00	Min. : 7.00
## 1st Qu.:43.75	1st Qu.:21.00	1st Qu.:12.00	1st Qu.:10.00
## Median :54.50	Median :25.50	Median :14.00	Median :12.00
## Mean :54.48	Mean :26.72	Mean :13.97	Mean :12.37
## 3rd Qu.:67.00	3rd Qu.:32.00	3rd Qu.:16.00	3rd Qu.:14.00
## Max. :91.00	Max. :51.00	Max. :23.00	Max. :22.00
## NA's :210	NA's :120	NA's :160	NA's :220
## fig2a.gpa2.sir2	fig2b.BY4742	fig2b.sir2	fig2b.sir2.fob1
## Min. : 7.00	Min. : 5.0	Min. : 5.00	Min. : 5
## 1st Qu.:10.00	1st Qu.:19.0	1st Qu.:12.00	1st Qu.:21
## Median :11.00	Median :26.0	Median :14.00	Median :30
## Mean :11.68	Mean :27.5	Mean :13.97	Mean :30
## 3rd Qu.:13.00	3rd Qu.:34.0	3rd Qu.:16.00	3rd Qu.:37
## Max. :20.00	Max. :65.0	Max. :23.00	Max. :65
## NA's :210	NA's :50	NA's :160	NA's :110
## fig2c.BY4742	fig2c.sir2.fob1	fig2c.sir2.fob1.hxk2	fig2d.BY4742
## Min. : 5.00	Min. : 5	Min. : 4.00	Min. : 5.00
## 1st Qu.:20.25	1st Qu.:21	1st Qu.:32.00	1st Qu.:20.25
## Median :26.00	Median :30	Median :48.00	Median :26.00

```

## Mean :26.52 Mean :30 Mean :45.27 Mean :26.52
## 3rd Qu.:31.00 3rd Qu.:37 3rd Qu.:58.00 3rd Qu.:31.00
## Max. :52.00 Max. :65 Max. :76.00 Max. :52.00
## NA's :80 NA's :110 NA's :190 NA's :80
## fig2d.sir2.fob1 fig2d.gpa2.sir2.fob1 fig3.by4742.2glucose
## Min. : 5 Min. : 5.00 Min. :13.0
## 1st Qu.:21 1st Qu.:48.75 1st Qu.:19.5
## Median :30 Median :55.00 Median :23.5
## Mean :30 Mean :50.98 Mean :24.8
## 3rd Qu.:37 3rd Qu.:64.00 3rd Qu.:29.0
## Max. :65 Max. :79.00 Max. :42.0
## NA's :110 NA's :210 NA's :230
## fig3.sir2.fob1.2glucose fig3.by4742.05glucose fig3.sir2.fob1.05glucose
## Min. : 5.00 Min. : 8.00 Min. :14.00
## 1st Qu.:19.00 1st Qu.:18.75 1st Qu.:29.25
## Median :22.50 Median :31.50 Median :33.00
## Mean :26.05 Mean :28.25 Mean :32.90
## 3rd Qu.:34.75 3rd Qu.:36.50 3rd Qu.:38.75
## Max. :48.00 Max. :44.00 Max. :47.00
## NA's :230 NA's :230 NA's :230
## fig3.WT.01glucose fig3.sir2.fob1.01glucose fig3.by4742.005glucose
## Min. :14.0 Min. :14.00 Min. :15.00
## 1st Qu.:22.0 1st Qu.:27.75 1st Qu.:27.25
## Median :30.0 Median :39.50 Median :31.50
## Mean :30.1 Mean :40.80 Mean :32.10
## 3rd Qu.:37.5 3rd Qu.:49.50 3rd Qu.:37.25
## Max. :45.0 Max. :69.00 Max. :53.00
## NA's :230 NA's :230 NA's :230
## fig3.sir2.fob1.005glucose fig4a.PSY316 fig4a.PSY316.fob1
## Min. : 9.00 Min. : 4.00 Min. : 5.00
## 1st Qu.:32.00 1st Qu.:15.75 1st Qu.:16.00
## Median :41.50 Median :23.00 Median :19.50
## Mean :41.95 Mean :21.12 Mean :20.27
## 3rd Qu.:51.75 3rd Qu.:25.00 3rd Qu.:23.00
## Max. :77.00 Max. :36.00 Max. :38.00
## NA's :230 NA's :210 NA's :210
## fig4a.PSY316.sir2ox fig4b.BY4742.2glucose fig4b.BY4742.005glucose
## Min. : 6.00 Min. : 4.00 Min. : 6.00
## 1st Qu.:18.00 1st Qu.:21.75 1st Qu.:24.75
## Median :23.00 Median :26.50 Median :31.00
## Mean :21.66 Mean :26.07 Mean :31.77
## 3rd Qu.:25.75 3rd Qu.:31.25 3rd Qu.:38.25
## Max. :37.00 Max. :42.00 Max. :60.00
## NA's :200 NA's :190 NA's :190
## fig4b.by4742.SIR2.ox.2glucose fig4b.by4742.SIR2.ox.005glucose
## Min. :20.00 Min. :13.00
## 1st Qu.:25.75 1st Qu.:32.75
## Median :32.00 Median :42.00
## Mean :34.60 Mean :42.23
## 3rd Qu.:42.00 3rd Qu.:54.25
## Max. :65.00 Max. :70.00
## NA's :190 NA's :170

```

```

strains = names(tb.ori)
strains

## [1] "X031104.BY2N.RLS.tab"          "X031104.SK1.RLS.tab"
## [3] "X042204.KLBY4716.RLS.tab"      "X052604.sir2D.rls.tab"
## [5] "X052604.W303.rls.tab"          "X053104.BY4741.rls.tab"
## [7] "X053104.BY4742.rls.tab"        "X053104.JSBY4741.rls.tab"
## [9] "X061004.srp1ts.rls.tab"        "fig1a.BY4742"
## [11] "fig1a.fob1"                    "fig1a.gpa2"
## [13] "fig1a.gpr1"                    "fig1a.hxk2"
## [15] "fig1b.BY4742"                  "fig1b.fob1"
## [17] "fig1b.hxk2"                    "fig1b.fob1.hxk2"
## [19] "fig1c.BY4742"                  "fig1c.fob1"
## [21] "fig1c.gpa2"                    "fig1c.fob1.gpa2"
## [23] "fig2a.BY4742"                  "fig2a.sir2"
## [25] "fig2a.hxk2.sir2"               "fig2a.gpa2.sir2"
## [27] "fig2b.BY4742"                  "fig2b.sir2"
## [29] "fig2b.sir2.fob1"               "fig2c.BY4742"
## [31] "fig2c.sir2.fob1"               "fig2c.sir2.fob1.hxk2"
## [33] "fig2d.BY4742"                  "fig2d.sir2.fob1"
## [35] "fig2d.gpa2.sir2.fob1"          "fig3.by4742.2glucose"
## [37] "fig3.sir2.fob1.2glucose"        "fig3.by4742.05glucose"
## [39] "fig3.sir2.fob1.05glucose"       "fig3.WT.01glucose"
## [41] "fig3.sir2.fob1.01glucose"       "fig3.by4742.005glucose"
## [43] "fig3.sir2.fob1.005glucose"      "fig4a.PSY316"
## [45] "fig4a.PSY316.fob1"              "fig4a.PSY316.sir2ox"
## [47] "fig4b.BY4742.2glucose"          "fig4b.BY4742.005glucose"
## [49] "fig4b.by4742.SIR2.ox.2glucose"  "fig4b.by4742.SIR2.ox.005glucose"

my.strains = c( "fig1b.BY4742", "fig2b.sir2", "fig4b.by4742.SIR2.ox.2glucose",
                "fig1b.fob1", "fig1b.hxk2", "fig1b.fob1.hxk2" )
tb = tb.ori[, my.strains]

```

## Now, fit all RLS data

```

for( BootstrapCount in 1:RUNS ) {#####

report = data.frame(my.strains)
report$samplesize = NA; report$R=NA; report$t0=NA; report$n=NA; report$G=NA; #report$longfilename=NA;

for( i in 1:length(report[,1])){
  my.data = tb[,i]
  my.data = my.data[! is.na(my.data)]
  report$samplesize[i] = length(my.data)

  #bootstrap
  bt.data = sample(my.data, replace=TRUE); # BOOTSTRAP HERE

  GompFlex = flexsurvreg(formula = Surv(bt.data) ~ 1, dist = 'gompertz')
  WeibFlex = flexsurvreg(formula = Surv(bt.data) ~ 1, dist = 'weibull')

  report$avgLS[i] = mean(bt.data)
}

```

```

report$stdLS[i] = sd(bt.data)
report$CV[i] = report$stdLS[i] / report$avgLS[i]

report$GompGFlex[i] = GompFlex$res[1,1]
report$GompRFlex[i] = GompFlex$res[2,1]
report$GompLogLikFlex[i] = round(GompFlex$loglik, 1)
report$GompAICFlex[i] = round(GompFlex$AIC)

report$WeibShapeFlex[i] = WeibFlex$res[1,1]
report$WeibRateFlex[i] = WeibFlex$res[2,1]
report$WeibLogLikFlex[i] = round(WeibFlex$loglik, 1)
report$WeibAICFlex[i] = round(WeibFlex$AIC)

#set initial values
Rhat = report$GompRFlex[i]; # 'i' was missing. a bug costed HQ a whole afternoon.
Ghat = report$GompGFlex[i];
nhat = 6;
t0 = (nhat-1)/Ghat;
fitBinom = optim ( c(Rhat, t0, nhat), llh.binomialMortality.single.run,
                  lifespan=bt.data,
                  #method='SANN') #SANN needs control
                  method="L-BFGS-B",
                  lower=c(1E-10, 1, 1), upper=c(1,200,20) );
report[i, c("R", "t0", "n")] = fitBinom$par[1:3]
report$G[i] = (report$n[i] - 1)/report$t0[i]
}

report$BestModel = ifelse(report$GompAICFlex < report$WeibAICFlex, "Gomp", "Weib")
report$BestModel = ifelse(abs(report$GompAICFlex - report$WeibAICFlex)<2, "<2", report$BestModel)

outname = paste("bootstrap/", BootstrapCount, ".csv", sep=''); #has to be changed here !!!
write.csv(report, file = outname, row.names = FALSE);
}#end of bootstrap loop

#summarize bootstrap results. Pick row-col value from every file into a buffer, then mean and stddev.
BootstrapMean = report;
BootstrapStd = report;
rownames = names(report);
for( col in 2:length(report[1,])) {
  for( row in 1:length(report[,1])) {
    buffer = c();
    for( BootstrapCount in 1:RUNS ) {
      filename = paste("bootstrap/", BootstrapCount, ".csv", sep='');
      tb = read.csv(filename)
      if( rownames[col] == "BestModel" ) {
        buffer = as.character( c(buffer, as.character(tb[row,col])) );
      } else {
        buffer = c(buffer, tb[row, col]);
      }
    }
  }
  if( rownames[col] == "BestModel" ) {
    tmp = table( buffer );
    BootstrapMean[row,col] = paste(names(tmp), tmp, sep="=", collapse = ":");
  }
}

```

```

    } else {
      BootstrapMean[row,col] = mean(buffer);
      BootstrapStd[row,col] = sqrt(var(buffer));
    }
  }
}

```

Means

BootstrapMean

```

##          my.strains samplesize          R          t0          n
## 1          fig1b.BY4742          250 0.004708628  56.24180  7.922145
## 2          fig2b.sir2           90 0.002756623  16.64246  7.992479
## 3 fig4b.by4742.SIR2.ox.2glucose        60 0.003275756  65.17513  7.827326
## 4          fig1b.fob1          140 0.003248661  71.42492  7.578751
## 5          fig1b.hxk2          120 0.005726745 101.27443  7.473746
## 6          fig1b.fob1.hxk2        160 0.005116934 118.11540  6.489875
##          G      avgLS      stdLS      CV  GompGFlex  GompRFlex
## 1 0.12657929 26.60008  9.442735 0.3550238 0.08563995 0.006622143
## 2 0.42381005 13.96167  3.475737 0.2492238 0.28589627 0.003522301
## 3 0.10568134 34.71917 10.692760 0.3080417 0.07758876 0.003834561
## 4 0.09246536 37.72079 13.345379 0.3541229 0.07027012 0.003454702
## 5 0.06511435 36.77242 16.244985 0.4422122 0.04882984 0.006685539
## 6 0.04692664 48.45856 21.188368 0.4376078 0.04253431 0.004086520
##  GompLogLikFlex GompAICFlex WeibShapeFlex WeibRateFlex WeibLogLikFlex
## 1      -937.131      1878.29      3.022195      29.74585      -914.135
## 2      -244.796      493.59      4.496926      15.28160      -239.528
## 3      -234.357      472.71      3.454696      38.59432      -226.861
## 4      -564.920     1133.84      3.156355      42.21174      -558.776
## 5      -506.822     1017.62      2.418024      41.44239      -501.431
## 6      -711.956     1427.90      2.477010      54.57205      -713.300
##  WeibAICFlex      BestModel
## 1      1832.25      Weib=100
## 2      483.10      <2=3:Weib=97
## 3      457.75      Weib=100
## 4      1121.55      <2=1:Weib=99
## 5      1006.87      <2=7:Gomp=2:Weib=91
## 6      1430.63 <2=19:Gomp=54:Weib=27

```

StdDev

BootstrapStd

```

##          my.strains samplesize          R          t0
## 1          fig1b.BY4742           0 0.0007733969 10.089212
## 2          fig2b.sir2           0 0.0004616108  1.884138
## 3 fig4b.by4742.SIR2.ox.2glucose        0 0.0006959081  7.475628
## 4          fig1b.fob1           0 0.0006137261  5.687067
## 5          fig1b.hxk2           0 0.0010394553 12.851031
## 6          fig1b.fob1.hxk2        0 0.0013206859  8.337785
##          n          G      avgLS      stdLS      CV  GompGFlex
## 1 0.8254120 0.019817150 0.5663741 0.4987466 0.01781953 0.006380810
## 2 0.2997794 0.033519479 0.3373620 0.3100617 0.02440963 0.030854697
## 3 0.5135925 0.011311338 1.4244978 0.8656708 0.02258140 0.008937955
## 4 0.4675306 0.007846272 1.1192157 0.6754263 0.02112949 0.005552063

```

```
## 5 0.6289857 0.010521835 1.5963305 0.8947421 0.02509163 0.003450914
## 6 0.6710336 0.008160688 1.5651023 0.8778060 0.02110012 0.003051159
##      GompRFlex GompLogLikFlex GompAICFlex WeibShapeFlex WeibRateFlex
## 1 0.0008777109      11.585804      23.157910      0.1554041      0.6319941
## 2 0.0012048661      7.741322      15.529116      0.4422881      0.3382291
## 3 0.0010341047      4.555211      9.007623      0.2681779      1.5803235
## 4 0.0006754558      6.771240      13.545076      0.2022666      1.1788294
## 5 0.0010866428      4.501864      9.003681      0.1562959      1.7967666
## 6 0.0006334812      5.733674      11.462279      0.1416391      1.7084932
##      WeibLogLikFlex WeibAICFlex BestModel
## 1      12.158452      24.30878      Weib
## 2      7.738140      15.46877      Weib
## 3      4.395496      8.82647      Weib
## 4      6.673846      13.37975      Weib
## 5      6.763713      13.50919      Weib
## 6      6.430719      12.84614      Gomp
```

Merge the two tables

```
BootstrapMean$Rstd = BootstrapStd$R
BootstrapMean$t0std = BootstrapStd$t0
BootstrapMean$nstd = BootstrapStd$n
BootstrapMean$Gstd = BootstrapStd$G
BootstrapMean$avgLSstd = BootstrapStd$avgLS
BootstrapMean$GompRFlexstd = BootstrapStd$GompRFlex
BootstrapMean$GompGFlexstd = BootstrapStd$GompGFlex
names(BootstrapMean)
```

```
## [1] "my.strains"      "samplesize"      "R"                "t0"
## [5] "n"              "G"              "avgLS"            "stdLS"
## [9] "CV"            "GompGFlex"      "GompRFlex"        "GompLogLikFlex"
## [13] "GompAICFlex"    "WeibShapeFlex"  "WeibRateFlex"     "WeibLogLikFlex"
## [17] "WeibAICFlex"    "BestModel"      "Rstd"             "t0std"
## [21] "nstd"          "Gstd"           "avgLSstd"         "GompRFlexstd"
## [25] "GompGFlexstd"
```

Reorganized the columns

```
BootstrapMean = BootstrapMean[, c( "my.strains", "samplesize", "R", "Rstd", "t0", "t0std", "n", "nstd", "G", "Gstd", "avgLS", "avgLSstd", "stdLS", "BestModel", "CV", "GompRFlex", "GompRFlexstd", "GompGFlex", "GompGFlexstd", "GompLogLikFlex", "GompAICFlex", "WeibShapeFlex", "WeibRateFlex", "WeibLogLikFlex", "WeibAICFlex" )];
BootstrapMean
```

```
##      my.strains samplesize      R      Rstd
## 1      fig1b.BY4742      250 0.004708628 0.0007733969
## 2      fig2b.sir2      90 0.002756623 0.0004616108
## 3 fig4b.by4742.SIR2.ox.2glucose      60 0.003275756 0.0006959081
## 4      fig1b.fob1      140 0.003248661 0.0006137261
## 5      fig1b.hxk2      120 0.005726745 0.0010394553
## 6      fig1b.fob1.hxk2      160 0.005116934 0.0013206859
##      t0      t0std      n      nstd      G      Gstd      avgLS
## 1 56.24180 10.089212 7.922145 0.8254120 0.12657929 0.019817150 26.60008
## 2 16.64246 1.884138 7.992479 0.2997794 0.42381005 0.033519479 13.96167
## 3 65.17513 7.475628 7.827326 0.5135925 0.10568134 0.011311338 34.71917
```

```
## 4 71.42492 5.687067 7.578751 0.4675306 0.09246536 0.007846272 37.72079
## 5 101.27443 12.851031 7.473746 0.6289857 0.06511435 0.010521835 36.77242
## 6 118.11540 8.337785 6.489875 0.6710336 0.04692664 0.008160688 48.45856
##      avgLSstd      stdLS      BestModel      CV      GompRFlex
## 1 0.5663741 9.442735      Weib=100 0.3550238 0.006622143
## 2 0.3373620 3.475737      <2=3:Weib=97 0.2492238 0.003522301
## 3 1.4244978 10.692760      Weib=100 0.3080417 0.003834561
## 4 1.1192157 13.345379      <2=1:Weib=99 0.3541229 0.003454702
## 5 1.5963305 16.244985      <2=7:Gomp=2:Weib=91 0.4422122 0.006685539
## 6 1.5651023 21.188368 <2=19:Gomp=54:Weib=27 0.4376078 0.004086520
##      GompRFlexStd GompGFlex GompGFlexStd GompLogLikFlex GompAICFlex
## 1 0.0008777109 0.08563995 0.006380810 -937.131 1878.29
## 2 0.0012048661 0.28589627 0.030854697 -244.796 493.59
## 3 0.0010341047 0.07758876 0.008937955 -234.357 472.71
## 4 0.0006754558 0.07027012 0.005552063 -564.920 1133.84
## 5 0.0010866428 0.04882984 0.003450914 -506.822 1017.62
## 6 0.0006334812 0.04253431 0.003051159 -711.956 1427.90
##      WeibShapeFlex WeibRateFlex WeibLogLikFlex WeibAICFlex
## 1 3.022195 29.74585 -914.135 1832.25
## 2 4.496926 15.28160 -239.528 483.10
## 3 3.454696 38.59432 -226.861 457.75
## 4 3.156355 42.21174 -558.776 1121.55
## 5 2.418024 41.44239 -501.431 1006.87
## 6 2.477010 54.57205 -713.300 1430.63
```

Merge mean and std for publication

```
BootstrapMeanPublishing = data.frame( BootstrapMean[, c("my.strains")] )
BootstrapMeanPublishing$RwithStd = as.vector( paste(round(BootstrapMean$R, 4), round(BootstrapMean$Rstd, 4)) )
BootstrapMeanPublishing$t0withStd = as.vector( paste(round(BootstrapMean$t0, 1), round(BootstrapMean$t0std, 4)) )
BootstrapMeanPublishing$nwithStd = as.vector( paste(round(BootstrapMean$n, 1), round(BootstrapMean$nstd, 4)) )
BootstrapMeanPublishing$GwithStd = as.vector( paste(round(BootstrapMean$G, 2), round(BootstrapMean$Gstd, 4)) )
BootstrapMeanPublishing$GompRFlexwithStd = as.vector( paste(round(BootstrapMean$GompRFlex, 3), round(BootstrapMean$GompRFlexstd, 4)) )
BootstrapMeanPublishing$GompGFlexwithStd = as.vector( paste(round(BootstrapMean$GompGFlex, 2), round(BootstrapMean$GompGFlexstd, 4)) )

BootstrapMeanPublishing$avgLSwithStd = as.vector( paste(round(BootstrapMean$avgLS, 2), round(BootstrapMean$avgLSstd, 4)) )

BootstrapMeanPublishing
```

```
##      BootstrapMean...c..my.strains...      RwithStd      t0withStd
## 1      fig1b.BY4742 0.0047 +/- 8e-04 56.2 +/- 10.1
## 2      fig2b.sir2 0.0028 +/- 5e-04 16.6 +/- 1.9
## 3      fig4b.by4742.SIR2.ox.2glucose 0.0033 +/- 7e-04 65.2 +/- 7.5
## 4      fig1b.fob1 0.0032 +/- 6e-04 71.4 +/- 5.7
## 5      fig1b.hxk2 0.0057 +/- 0.001 101.3 +/- 12.9
## 6      fig1b.fob1.hxk2 0.0051 +/- 0.0013 118.1 +/- 8.3
##      nwithStd      GwithStd GompRFlexwithStd GompGFlexwithStd
## 1 7.9 +/- 0.825 0.13 +/- 0.02 0.007 +/- 0.001 0.09 +/- 0.006
## 2 8 +/- 0.3 0.42 +/- 0.034 0.004 +/- 0.001 0.29 +/- 0.031
## 3 7.8 +/- 0.514 0.11 +/- 0.011 0.004 +/- 0.001 0.08 +/- 0.009
## 4 7.6 +/- 0.468 0.09 +/- 0.008 0.003 +/- 0.001 0.07 +/- 0.006
## 5 7.5 +/- 0.629 0.07 +/- 0.011 0.007 +/- 0.001 0.05 +/- 0.003
## 6 6.5 +/- 0.671 0.05 +/- 0.008 0.004 +/- 0.001 0.04 +/- 0.003
##      avgLSwithStd
## 1 26.6 +/- 0.566
```



```
## 2 13.96 +/- 0.337
## 3 34.72 +/- 1.424
## 4 37.72 +/- 1.119
## 5 36.77 +/- 1.596
## 6 48.46 +/- 1.565
```

output

```
write.csv(BootstrapMean, file='sandbox/_Kaberlein04_Bootstrap_summary.csv', row.names = FALSE)
write.csv(BootstrapMeanPublishing, file='sandbox/_Kaberlein04_Bootstrap_summary_Publications.csv', row.names = FALSE)
```