Results_Resample

Due May 3, 2019

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Data Generation Functions

Seeding Functions

Simulation Functions

Bayesian Functions

Resampling Functions

MLB Data

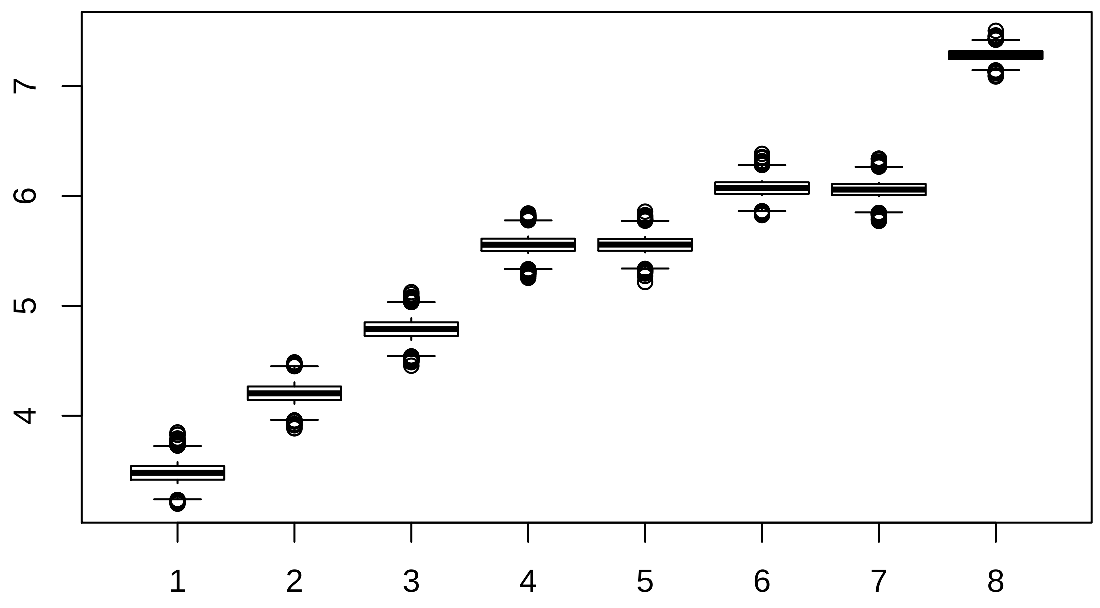
Results

Resample_results

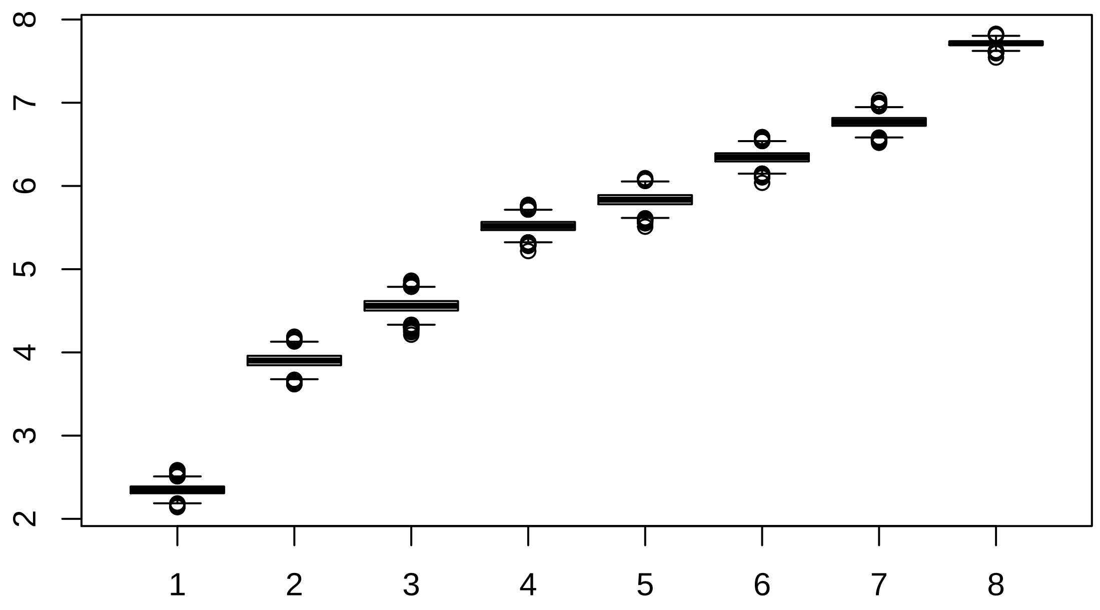
```
#another version of simTournament
#returns the final standing of teams
#for example: 2 3 1 4
#means team2 is winner, team3 is second,...
simTournament <- function(bracket, matchups) {
  # function to simulate a tournament given a bracket and probability matrix

  # INPUT:
  # bracket is the bracket structure
  # matchups is the matchup/probability matrix

  # OUTPUT:
  # final standing of teams

  nTeams <- length(bracket)
  newBracket <- bracket
  nRounds <- log2(nTeams)
  #results = c("Winner"=-1,"WinsPerTeam"=list(rep(0, ncol(matchups))))
  results <- numeric(nTeams)

  for (round in 1:nRounds) {
    #winsPrev = results["WinsPerTeam"]
    oldBracket <- newBracket
    newBracket <- simRound(newBracket, matchups)
    results[(2^(nRounds-round)+1):2^(nRounds-round+1)] <-
      setdiff(oldBracket,newBracket)
  }

  results[1] <- newBracket
  return(results)
}



#INPUT: x is index of the team
#       res is simulation results
#OUTPUT: rank of x in simulations
getRank <- function(x, res, lower = T){
  n <- length(res)
  rank <- numeric(n)
  for(i in 1:n){
    roughrank <- which(res[[i]]==x)
    if(roughrank == 2 | roughrank == 1)
      rank[i] <- roughrank
    #pick lowest rank for a range of rank
    #for example, if rank is 5th-8th, let rank be 8
    else if(lower == T)
      rank[i] <- 2^ceiling(log2(roughrank))
    #if lower = F pick highest rank in range
    else
      rank[i] <- 2^floor(log2(roughrank))+1
  }
  rank
}
```

```
numTeams = 8
nSim = 1000

#set.seed(428)
power <- genNormalPowers(numTeams)
prob = genCrossTeamWinningProbabilities(power)
#with random seeding
res = replicate(nSim, simTournament(
  sample(1:numTeams), prob),simplify = FALSE)
#ranks of each team
ranks <- lapply(1:numTeams, getRank, res = res)
#bootstrap estimation on mean of ranks of each team
mean_boot <- lapply(ranks, boot_replicate)
#a box plot of ranking of each team
mean_boot_raw <- lapply(mean_boot, function(x) x$boot)
```

```
boxplot(mean_boot_raw)
```



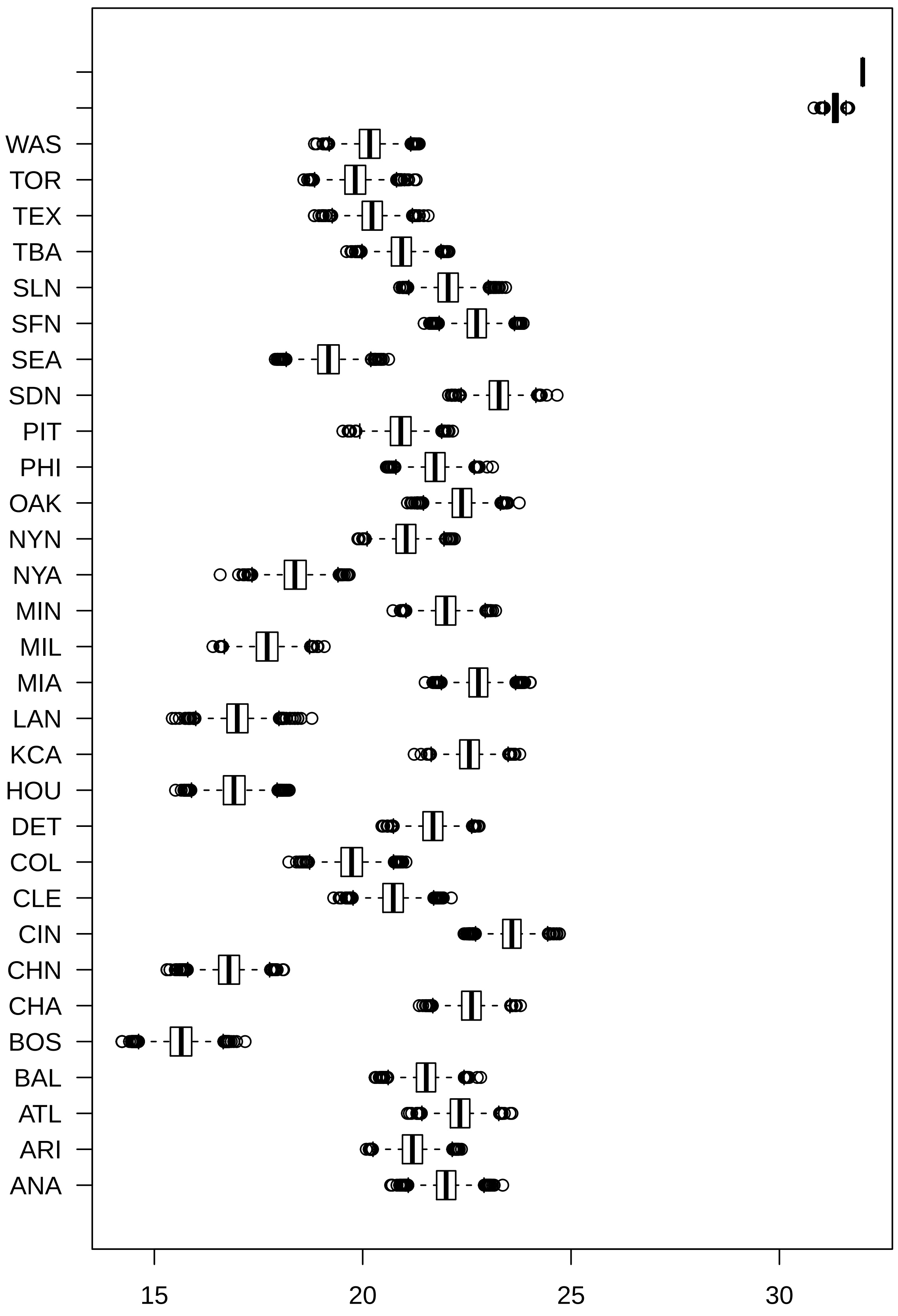
```
#with seeding
seeds = tournament_seeding(numTeams)
res = replicate(nSim, simTournament(seeds, prob), simplify = FALSE)
#ranks of each team
ranks <- lapply(1:numTeams, getRank, res = res)
#bootstrap estimation on mean of ranks of each team
mean_boot <- lapply(ranks, boot_replicate)
#a box plot of ranking of each team
mean_boot_raw <- lapply(mean_boot, function(x) x$boot)
boxplot(mean_boot_raw)
```



Some NLB

```r
nSim = 1000
#add 2 dummy team as there're 30 teams in NLB
numTeams <- 32
prob <- cbind(rbind(winprob,numeric(30),numeric(30)),rep(1.,32),rep(1.,32))
prob[32,31] <- 0

res = replicate(nSim, simTournament(
  sample(1:numTeams), prob),simplify = FALSE)
#ranks of each team
ranks <- lapply(1:numTeams, getRank, res = res)
#bootstrap estimation on mean of ranks of each team
mean_boot <- lapply(ranks, boot_replicate)
#a box plot of ranking of each team
mean_boot_raw <- lapply(mean_boot, function(x) x$boot)
names(mean_boot_raw) <- dimnames(prob)[[1]]
```

```r
boxplot(mean_boot_raw,horizontal = T, las = 1)
```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TEX
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SLN
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NYN
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MIN
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LAN
KCA
HOU
DET
COL
CLE
CIN
CHN
CHA
BOS
BAL
ATL
ARI
ANA
15
20
25
30