marchmadness2017

```
library(plyr)
library(dplyr)
```

```
##
## Attaching package: 'dplyr'
```

```
## The following objects are masked from 'package:plyr':
##
##     arrange, count, desc, failwith, id, mutate, rename, summarise,
##     summarize
```

```
## The following objects are masked from 'package:stats':
##
##     filter, lag
```

```
## The following objects are masked from 'package:base':
##
##     intersect, setdiff, setequal, union
```

```
library(stringr)
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 3.3.2
```

```
inpath <- "C:/Users/jroberti/Git/mm2017/data/"
    #"C:/Users/Amy/Documents/GitHub/mm2017/data/"

reg <- read.csv(paste0(inpath, "RegularSeasonCompactResults.csv"), stringsAsFactors = FALSE)

team <- read.csv(paste0(inpath, "Teams.csv"), stringsAsFactors = FALSE)
seasons <- read.csv(paste0(inpath, "Seasons.csv"), stringsAsFactors = FALSE)

tourney <- read.csv(paste0(inpath, "TourneyCompactResults.csv"), stringsAsFactors = FALSE)

head(reg)
```

```
##   Season Daynum Wteam Wscore Lteam Lscore Wloc Numot
## 1   1985     20  1228     81  1328     64    N     0
## 2   1985     25  1106     77  1354     70    H     0
## 3   1985     25  1112     63  1223     56    H     0
## 4   1985     25  1165     70  1432     54    H     0
## 5   1985     25  1192     86  1447     74    H     0
## 6   1985     25  1218     79  1337     78    H     0
```

```
reg$wdiff <- reg$Wscore - reg$Lscore
reg$ldiff <- reg$Lscore - reg$Wscore

wreg <- select(reg, Season, Daynum, Wteam, Wscore, Wloc, Numot, wdiff) %>% rename(team=Wteam,score=Wsco
lreg <- select(reg, Season, Daynum, Lteam, Lscore, Wloc, Numot, ldiff) %>% rename(team=Lteam,score=Lsco

outreg <- rbind(wreg,lreg)
outreg$outcome <- ifelse(outreg$diff > 0, "win", "loss")
```

```
### NEED TO TURN OFF PLYR if dplyr:: is not specified for summarise
#detach(package:plyr)
start <- Sys.time()
proc_reg <- group_by(outreg, Season, team) %>%
  ## need to make sure to use summarise from dplyr, not plyr
  dplyr::summarise(totwin=sum(str_count(outcome, "win")),  # count total wins for the season
                   totloss=sum(str_count(outcome, "loss")),
                   ## average win margin - filter out negatives (those are losses), can do stdev too wi
                   wdiff_avg=mean(ifelse(diff>0, as.numeric(diff), 0)),
                   ldiff_avg=mean(ifelse(diff<0, as.numeric(diff), 0)),## average loss margin
                   score_avg=mean(score),
                   score_sd=sd(score),
                   wdiff_sd=sd(ifelse(diff>0, as.numeric(diff),0)),
                   ldiff_sd=sd(ifelse(diff<0, as.numeric(diff),0))
                   )
end <- Sys.time()
end - start # takes about 2.5 seconds to run
```

```
## Time difference of 3.641005 secs
```

```
head(proc_reg)
```

```
## Source: local data frame [6 x 10]
## Groups: Season [1]
##
##   Season  team totwin totloss   wdiff_avg  ldiff_avg score_avg  score_sd
##    <int> <int>  <int>   <int>       <dbl>      <dbl>     <dbl>     <dbl>
## 1   1985  1102      5      19  2.08333333  -7.875000  63.08333  9.964793
## 2   1985  1103      9      14  2.95652174  -6.000000  61.04348 11.125230
## 3   1985  1104     21       9  9.23333333  -1.433333  68.50000 13.860761
## 4   1985  1106     10      14  3.95833333  -7.750000  71.62500 11.765138
## 5   1985  1108     19       6 10.52000000  -2.560000  83.00000 14.077168
## 6   1985  1109      1      23  0.04166667 -29.166667  53.83333 11.567070
## # ... with 2 more variables: wdiff_sd <dbl>, ldiff_sd <dbl>
```

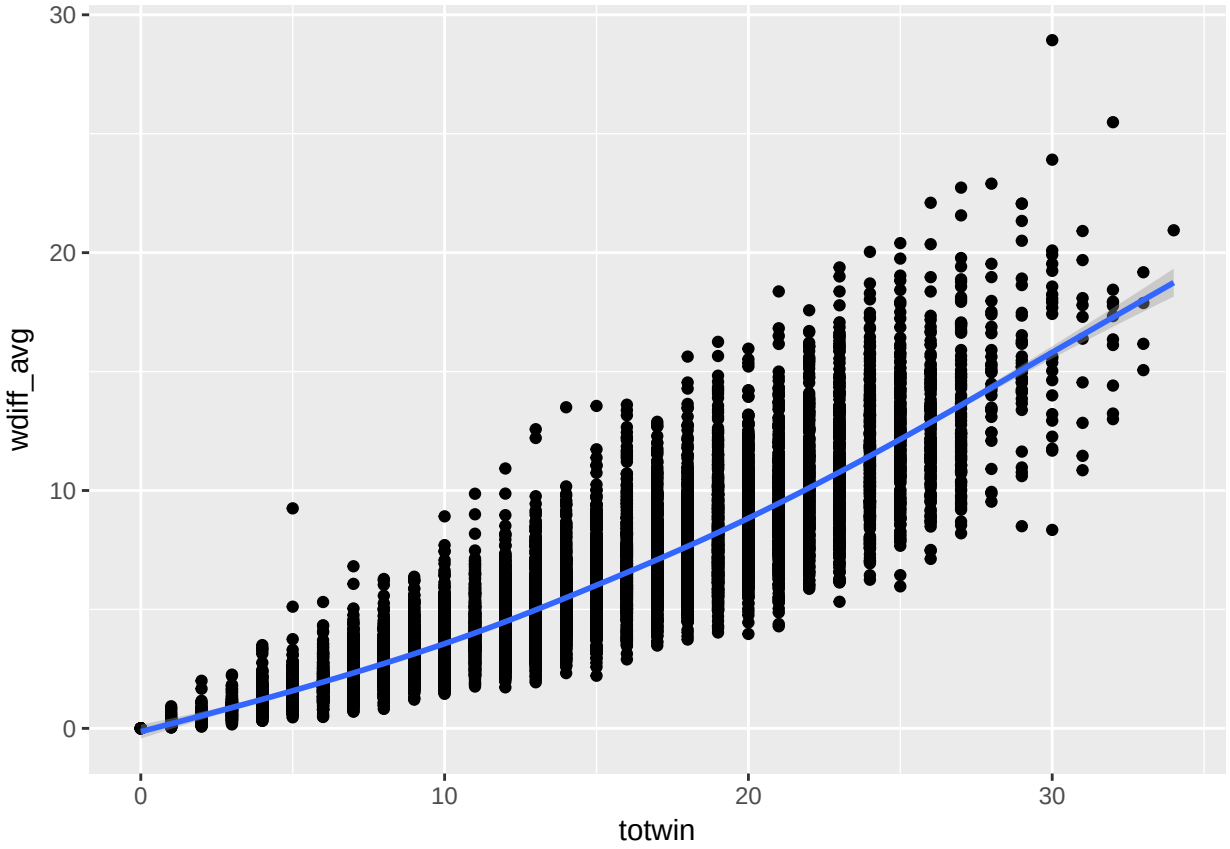
Process Tournament Data

```
tourney$wdiff <- tourney$Wscore - tourney$Lscore
tourney$ldiff <- tourney$Lscore - tourney$Wscore

wtourney <- select(tourney, Season, Daynum, Wteam, Wscore, Wloc, Numot, wdiff) %>% rename(team=Wteam,sc
ltourney <- select(tourney, Season, Daynum, Lteam, Lscore, Wloc, Numot, ldiff) %>% rename(team=Lteam,sc

outtourney <- rbind(wtourney,ltourney)
outtourney$outcome <- ifelse(outtourney$diff > 0, "win", "loss")

proc_tourn <- group_by(outtourney, Season, team) %>%
  ## need to make sure to use summarise from dplyr, not plyr
  dplyr::summarise(totwin=sum(str_count(outcome, "win")),  # count total wins for the season
                   totloss=sum(str_count(outcome, "loss")),
                   ## average win margin - filter out negatives (those are losses), can do stdev too wi
                   wdiff_avg=mean(ifelse(diff>0, as.numeric(diff), 0)),
                   ldiff_avg=mean(ifelse(diff<0, as.numeric(diff), 0)),## average loss margin
```

```
                  score_avg=mean(score),
                  score_sd=sd(score),
                  wdiff_sd=sd(ifelse(diff>0, as.numeric(diff),0)),
                  ldiff_sd=sd(ifelse(diff<0, as.numeric(diff),0))
                  )

## rename "T_" == tournament data
names(proc_tourn) <- paste0("T_",names(proc_tourn))
```

```
ggplot(proc_reg, aes(totwin,wdiff_avg)) + geom_point() + geom_smooth()
```

```
## `geom_smooth()` using method = 'gam'
```



Execute a merge

```
## make keys to match the data between the two tables
proc_reg$key <- paste0(proc_reg$Season,"_",proc_reg$team)
proc_tourn$key <- paste0(proc_tourn$T_Season,"_",proc_tourn$T_team)

## the tournament results should be the left table, because the proc_reg table
## has results of ALL teams that played (i.e. even teams that didn't make it to the tourney)
model_dat <- merge(proc_tourn, proc_reg, by.x="key", by.y="key")

model_dat$win_pct <- model_dat$totwin / (model_dat$totwin + model_dat$totloss)
```

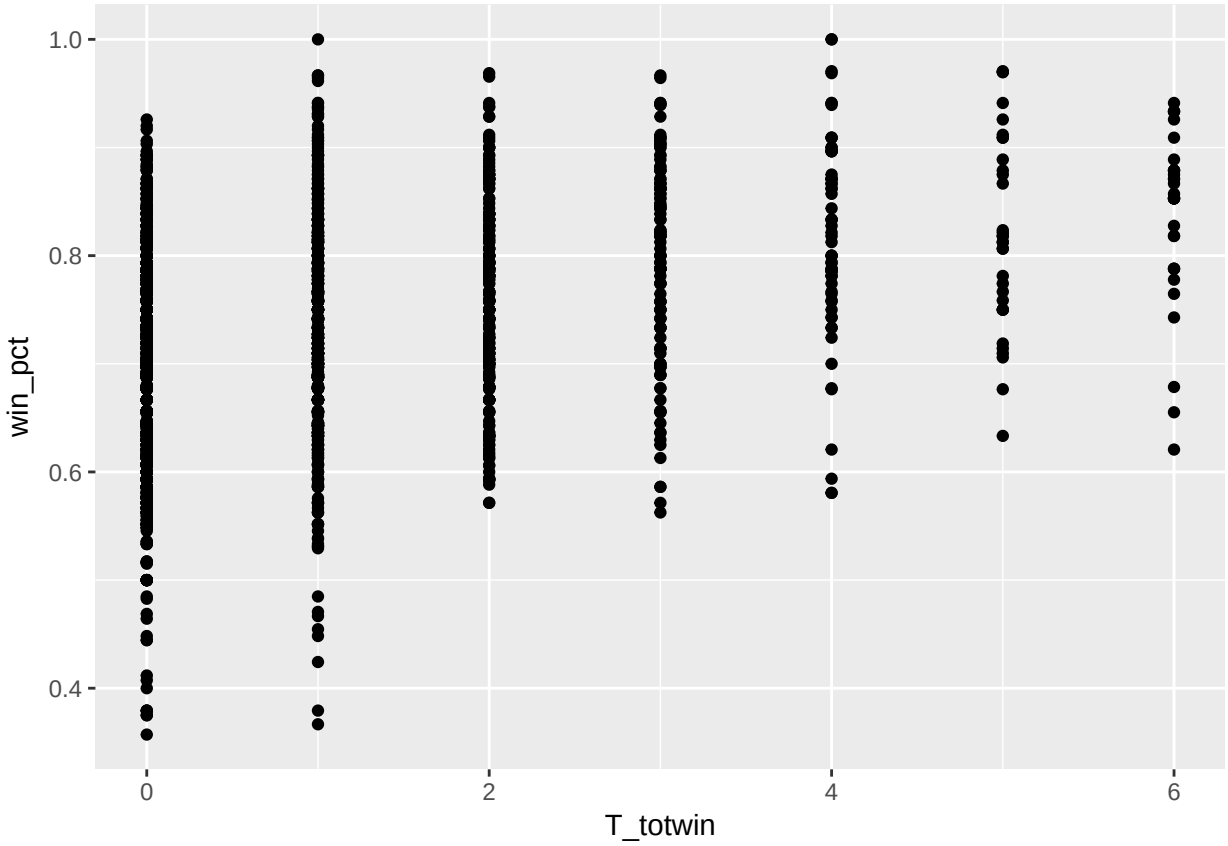
try a simple model

```
m1 <- lm(T_totwin ~ win_pct + wdiff_avg + ldiff_avg + wdiff_sd + ldiff_sd, data = model_dat)
summary(m1)
```

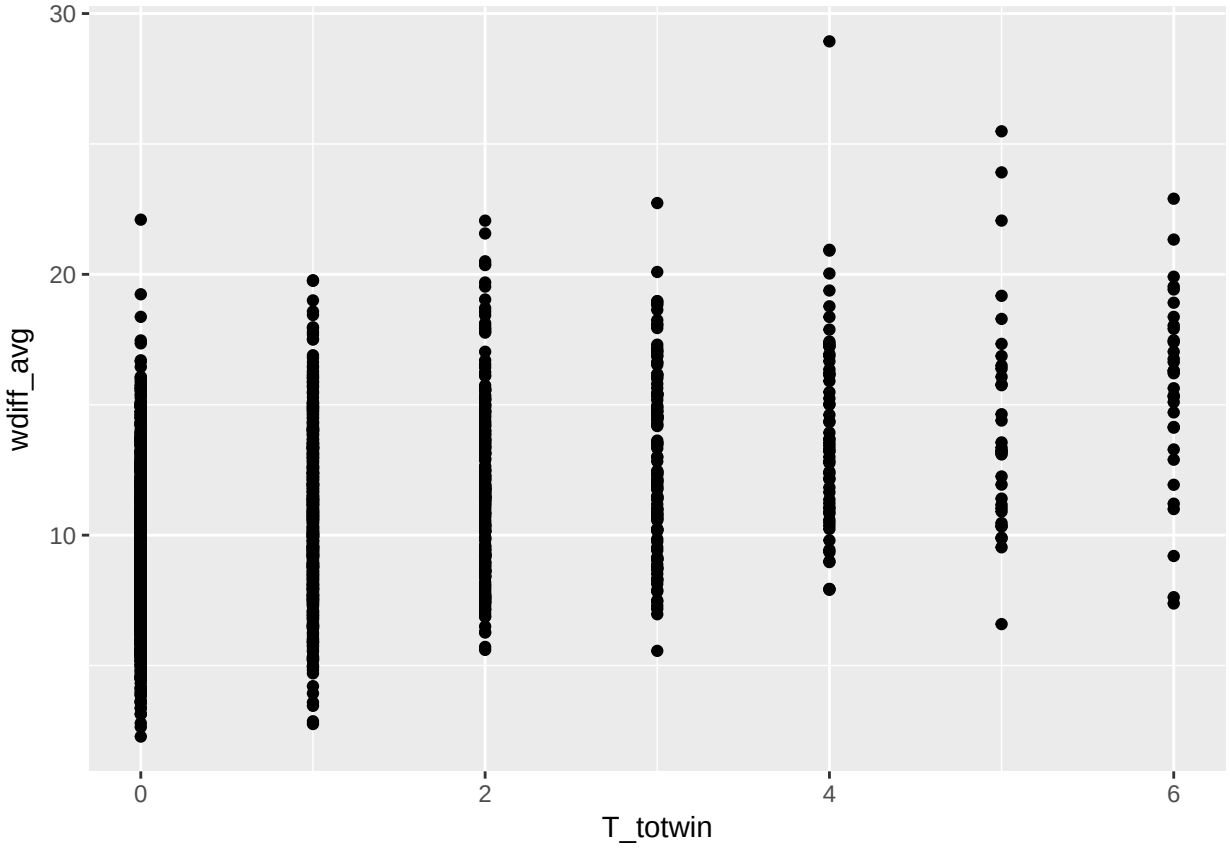
```
##
## Call:
## lm(formula = T_totwin ~ win_pct + wdiff_avg + ldiff_avg + wdiff_sd +
##     ldiff_sd, data = model_dat)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -2.7341 -0.7664 -0.2809  0.5174  5.6076
##
## Coefficients:
##              Estimate Std. Error t value Pr(>|t|)
## (Intercept) -1.493944   0.523733  -2.852  0.00438 **
## win_pct      1.769504   0.684868   2.584  0.00984 **
## wdiff_avg    0.142103   0.020666   6.876  8.1e-12 ***
## ldiff_avg   -0.218296   0.073286  -2.979  0.00293 **
## wdiff_sd     0.003513   0.019525   0.180  0.85725
## ldiff_sd    -0.169568   0.035324  -4.800  1.7e-06 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.179 on 2076 degrees of freedom
## Multiple R-squared:  0.2206, Adjusted R-squared:  0.2187
## F-statistic: 117.5 on 5 and 2076 DF,  p-value: < 2.2e-16
```

try some viz for tourney data

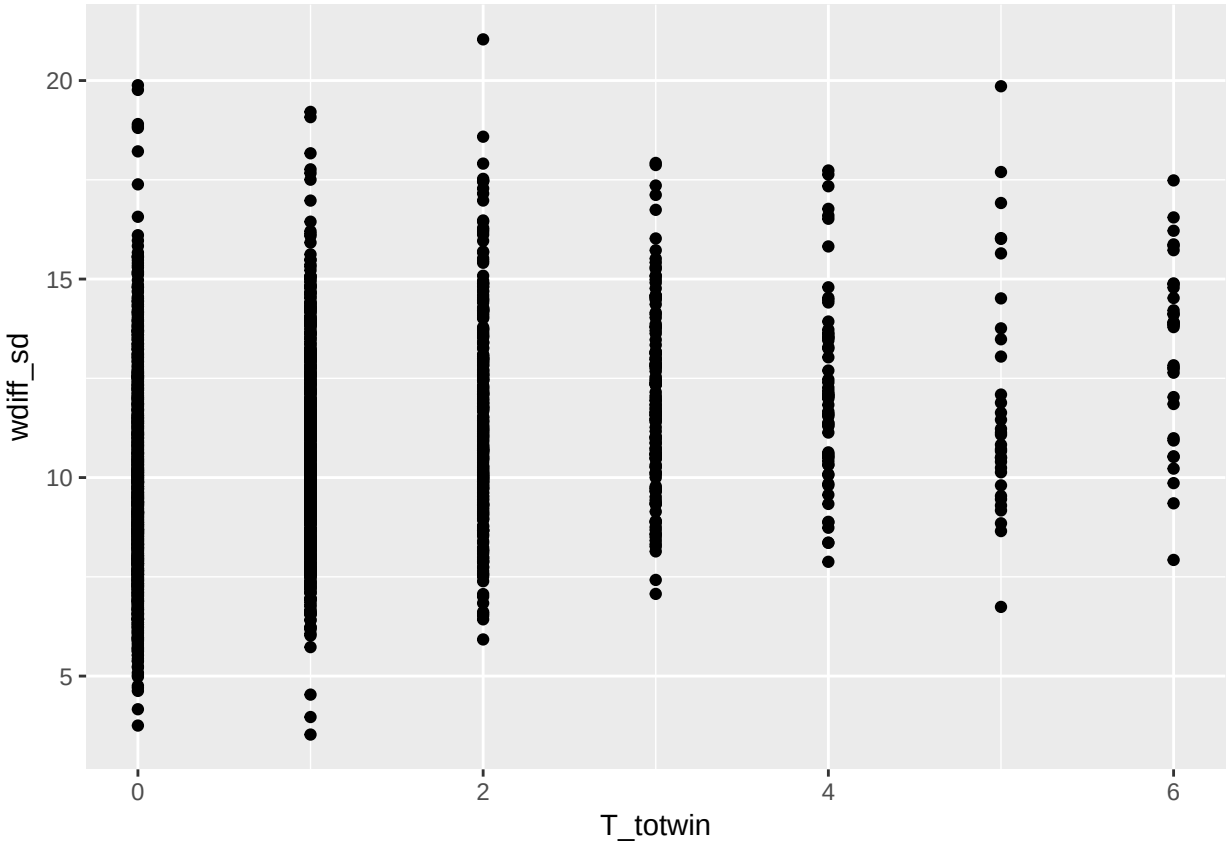
```
ggplot(model_dat, aes(T_totwin,win_pct)) + geom_point()
```




```
ggplot(model_dat, aes(T_totwin,wdiff_avg)) + geom_point()
```




```
ggplot(model_dat, aes(T_totwin,wdiff_sd)) + geom_point()
```


20
15
10
5
wdiff_sd
0
2
4
6
T_totwin