Dynamic Soccer models: checks using simulated data

Contents


```
rm(list = ls())
library(data.table)
library(ggplot2)
library(rstan)

rstan_options(auto_write = TRUE)
options(mc.cores = parallel::detectCores())
source("code/simulateData.R")
source("code/plot_ground_truth_vs_estimate.R")
source("code/ppc_coverage_plot.R")
source("code/MakeTimeSeriesPlot.R")
source("code/Create_model_data_for_TS2.R")
source("code/addTeamIds.R")
source("code/create_league_table.R")
source("code/MakeEPLPlotAbility.R")
source("code/games_predicted_vs_actual_intervals.R")
source("code/ppc_coverage_plot.R")
source("code/calc_rps_scores.R")
source("code/odds_to_probability.R")
source("code/ReadfitsandCalculateRPS.R")
source("code/FitOneStepAhead.R")

# create output folder
if(!dir.exists("../output")) {dir.create("../output")}
```

Simulate data acc to dynamic Skellam model

```
source("code/simulateData.R")
my_par_list <- list(nseasons = 2,
                    nteams = 18,
                    nrounds = 34,
                    offense_sigma = 0.25,
                    defense_sigma = 0.25,
                    mixing_proportion = 0.05, # 5% excess draws to test the zero inflation
                    mu_const = 0,
                    home_advantage = 0.4,
                    hyper_variance = 0.1,
                    art_turf_vec = c(rep(0, 12), rep(1, 6)), # not used
```

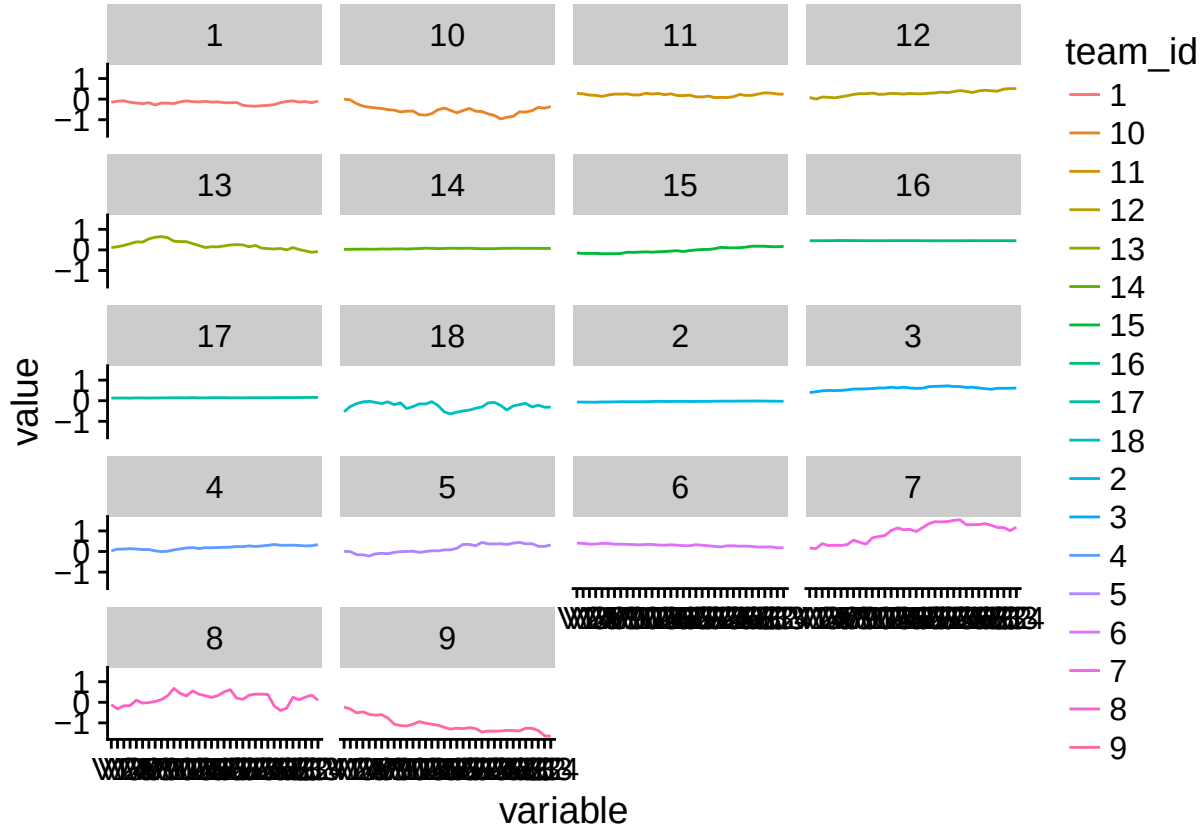
```
                  art_turf_advantage = 0 # not used
)


model_data <- Simulate_dynamic_ZPD_data(seed = 123, my_par_list)
```

plot abilities

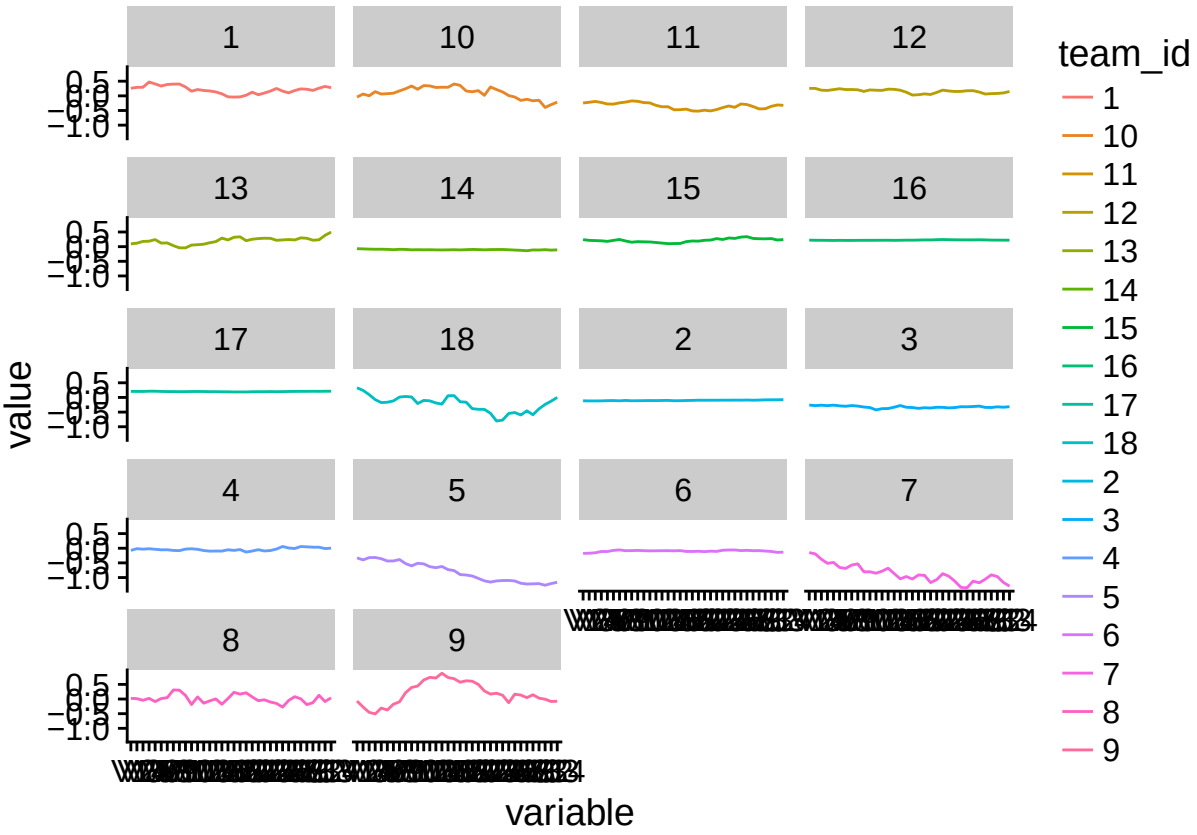
```
ma_offense <- data.table(melt(model_data$a_offense))

ggplot(ma_offense[variable %in% c(paste("V", 1:34, sep = '')),], aes(x= variable, y = value,
                        group = team_id, col = team_id)) + geom_line() + facet_wrap(~ team_id, ncol = 4)
```




```
ma_defense <- data.table(melt(model_data$a_defense))

## Using team_id as id variables
ggplot(ma_defense[variable %in% c(paste("V", 1:34, sep = '')),], aes(x= variable, y = value,
                        group = team_id, col = team_id)) + geom_line() + facet_wrap(~ team_id, ncol = 4)
```



Fit model

```
fullrun <- 0

if(fullrun) {
stanfit_sim_skellam <- stan(
  file = "models\\skellam_dynamic.stan",
  data = model_data,
  chains = 4,
  warmup = 500,
  init_r = 0.1, # instead of 2
  iter = 1500,
  cores = 4,
  control = list(adapt_delta = 0.95)
  )
  saveRDS(stanfit_sim_skellam, "FITS\\skellam_dynamic_sim.rds")
}
```

Analyse results

```
stanfit_sim_skellam <- readRDS("FITS\\skellam_dynamic_sim.rds")
print(stanfit_sim_skellam, c("constant_mu", "home_advantage", "mixing_proportion"))
```

```
## Inference for Stan model: skellam_dynamic.
## 4 chains, each with iter=1500; warmup=500; thin=1;
## post-warmup draws per chain=1000, total post-warmup draws=4000.
##
##                    mean se_mean   sd  2.5%   25%   50%  75% 97.5% n_eff
## constant_mu       -0.05       0 0.15 -0.36 -0.14 -0.04 0.06  0.24  4000
## home_advantage     0.43       0 0.06  0.32  0.39  0.43 0.47  0.55  4000
## mixing_proportion  0.05       0 0.02  0.01  0.04  0.05 0.07  0.10  4000
##                   Rhat
## constant_mu          1
## home_advantage       1
## mixing_proportion    1
##
## Samples were drawn using NUTS(diag_e) at Fri Feb 23 10:47:28 2018.
## For each parameter, n_eff is a crude measure of effective sample size,
## and Rhat is the potential scale reduction factor on split chains (at
## convergence, Rhat=1).
```

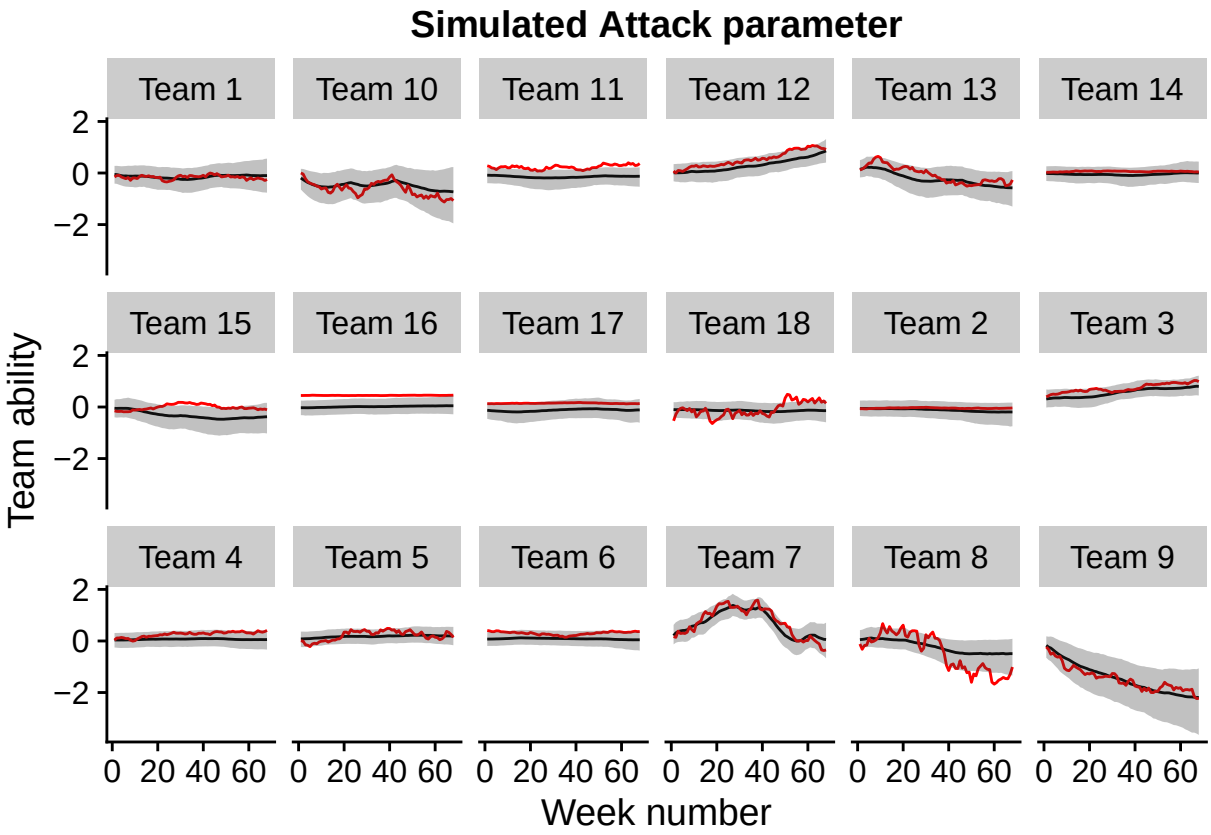
```
sims <- extract(stanfit_sim_skellam)

a_sims <- sims$a_offense

id_lut <- model_data$id_lut

MakeTimeSeriesPlotSim(a_sims, model_data$a_offense, id_lut, title = "Simulated Attack parameter")
```

```
## Using team_id as id variables
```



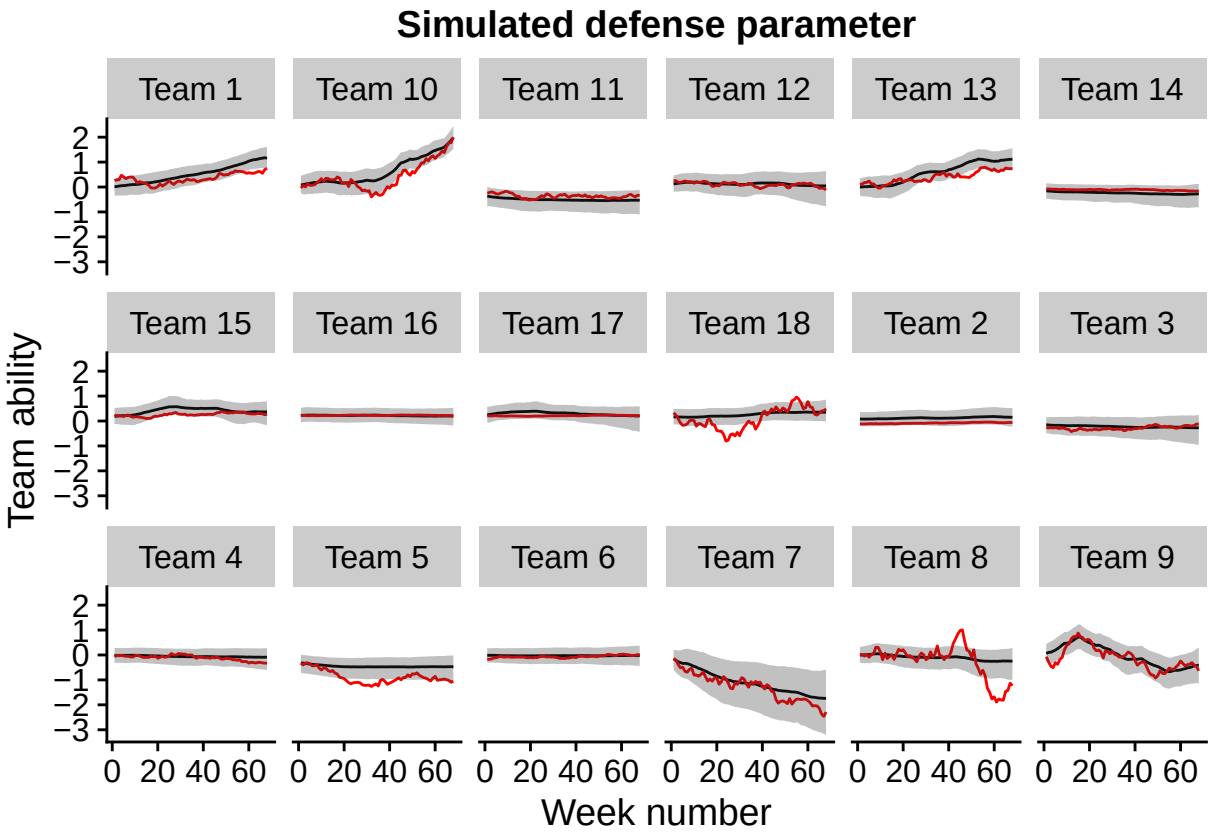

```
source("code/MakeTimeSeriesPlot.R")
sims <- extract(stanfit_sim_skellam)

a_sims <- sims$a_defense

id_lut <- model_data$id_lut

MakeTimeSeriesPlotSim(a_sims, model_data$a_defense, id_lut, title = "Simulated defense parameter")
```

```
## Using team_id as id variables
```


Simulated defense parameter
Team 1
Team 10
Team 11
Team 12
Team 13
Team 14
Team 15
Team 16
Team 17
Team 18
Team 2
Team 3
Team 4
Team 5
Team 6
Team 7
Team 8
Team 9
Team ability
2
1
0
−1
−2
−3
0
20
40
60
Week number