CUNY SPS DATA 621 - CTG5 - HW1

Betsy Rosalen, Gabrielle Bartomeo, Jeremy O'Brien, Lidiia Tronina, Rose Koh

February 27, 2019

Contents

1 Data exploration

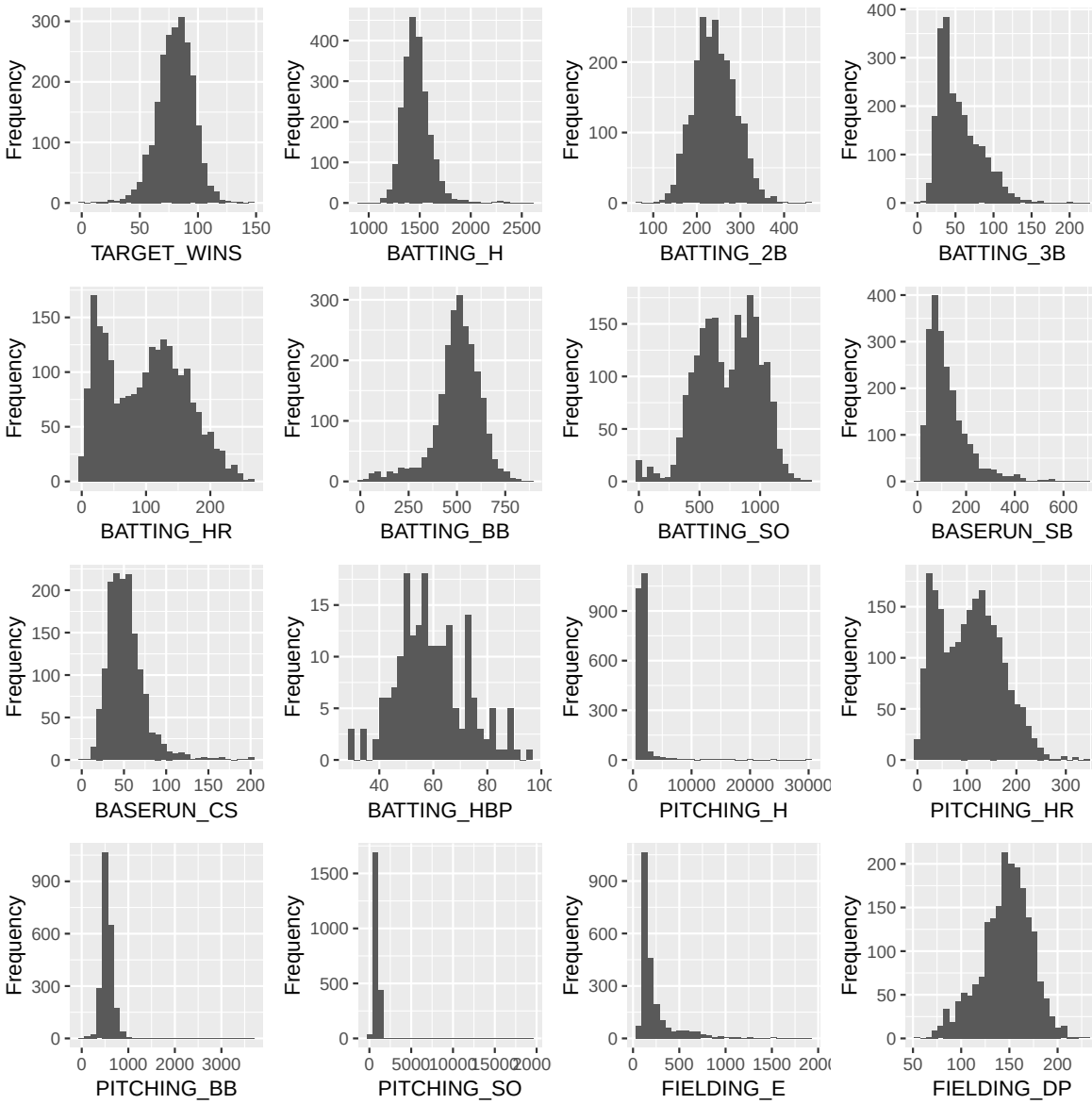
- Describe the size:

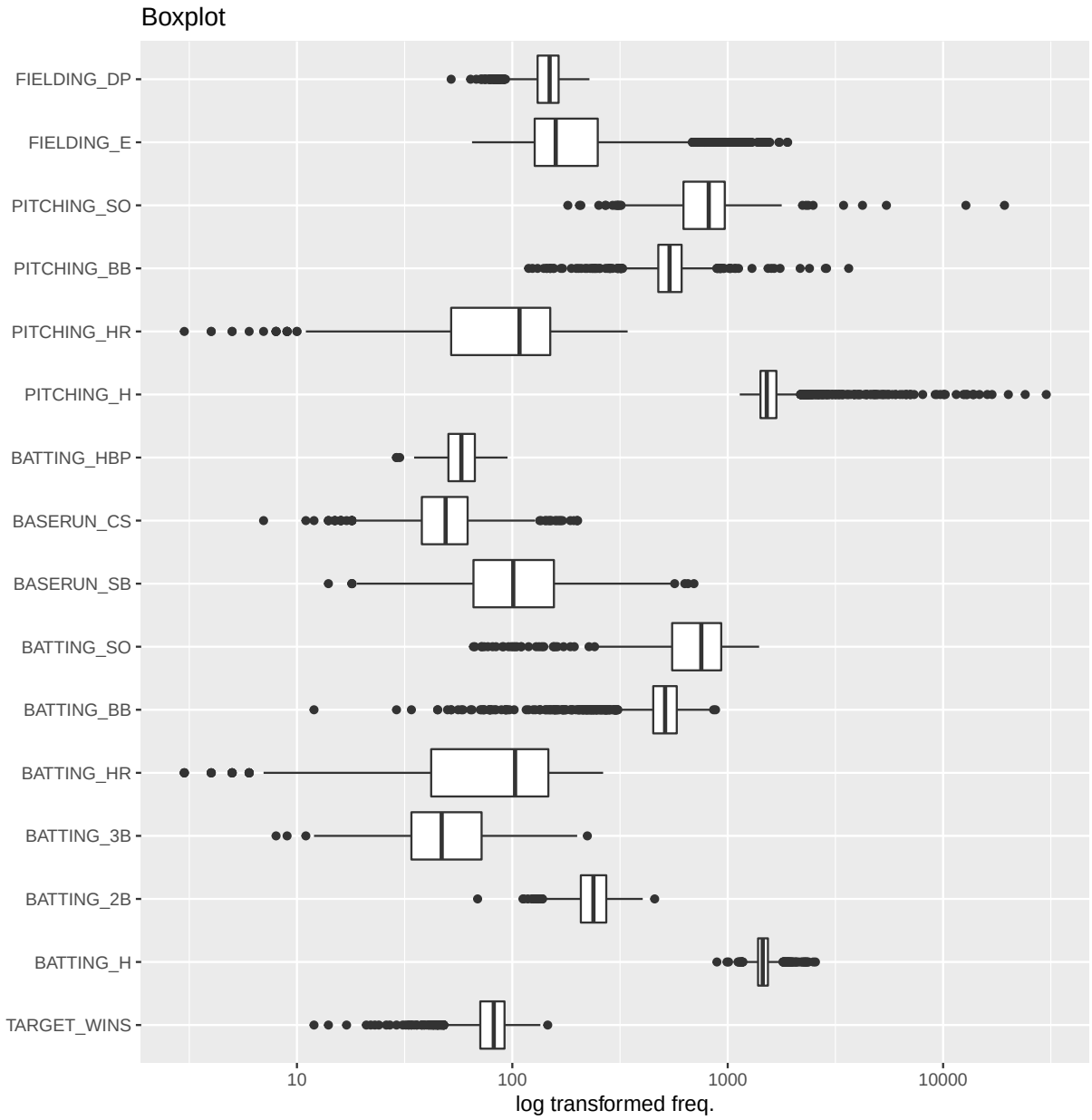
The money ball data is 144kb in size. The data contains 2,276 rows and 16 columns without the index. The variables are continuous integer. The `TARGET_WINS` is our response variable. There are 3,478 missing values out of 36,416 observations.

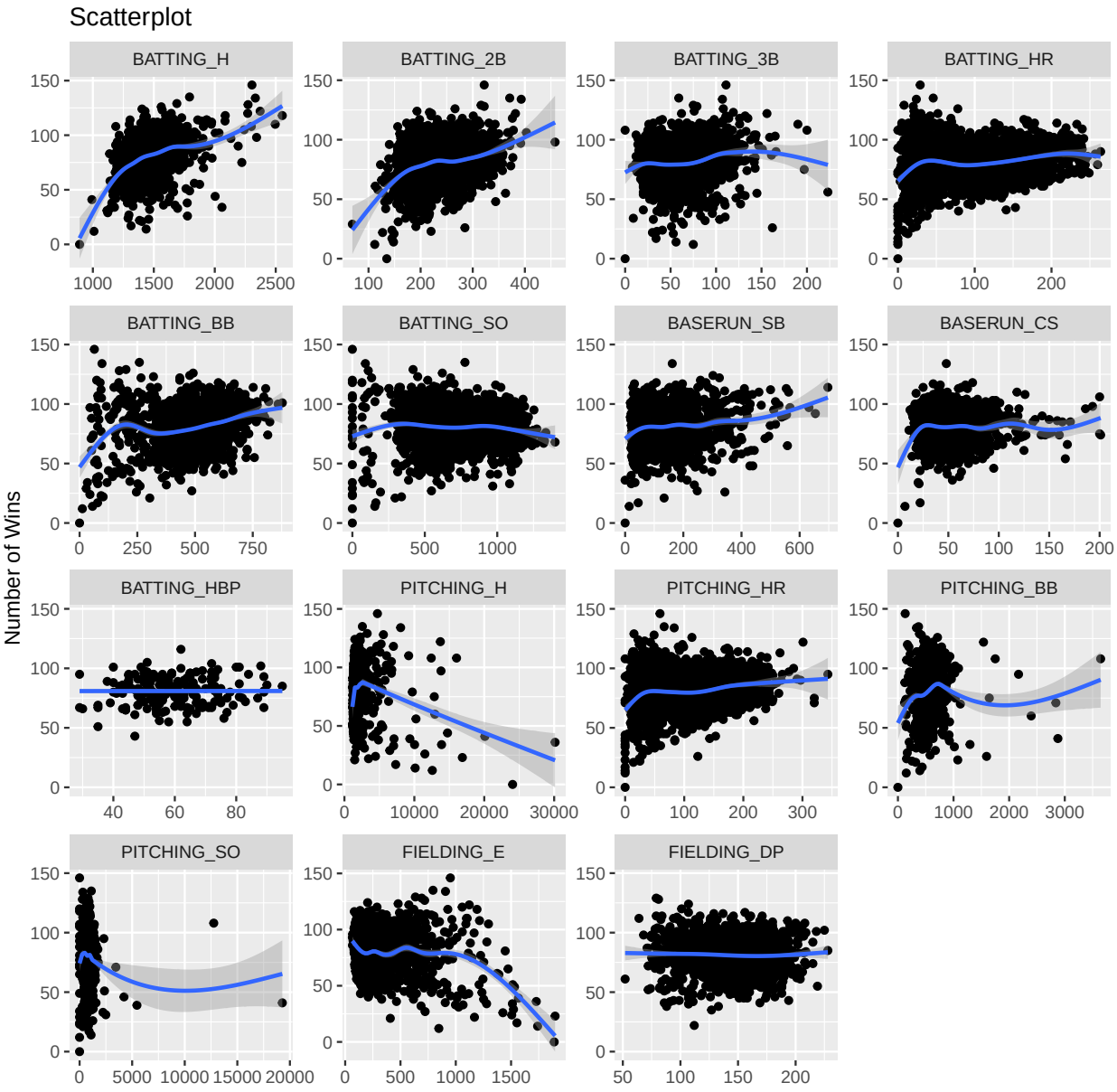
- Statistics summary

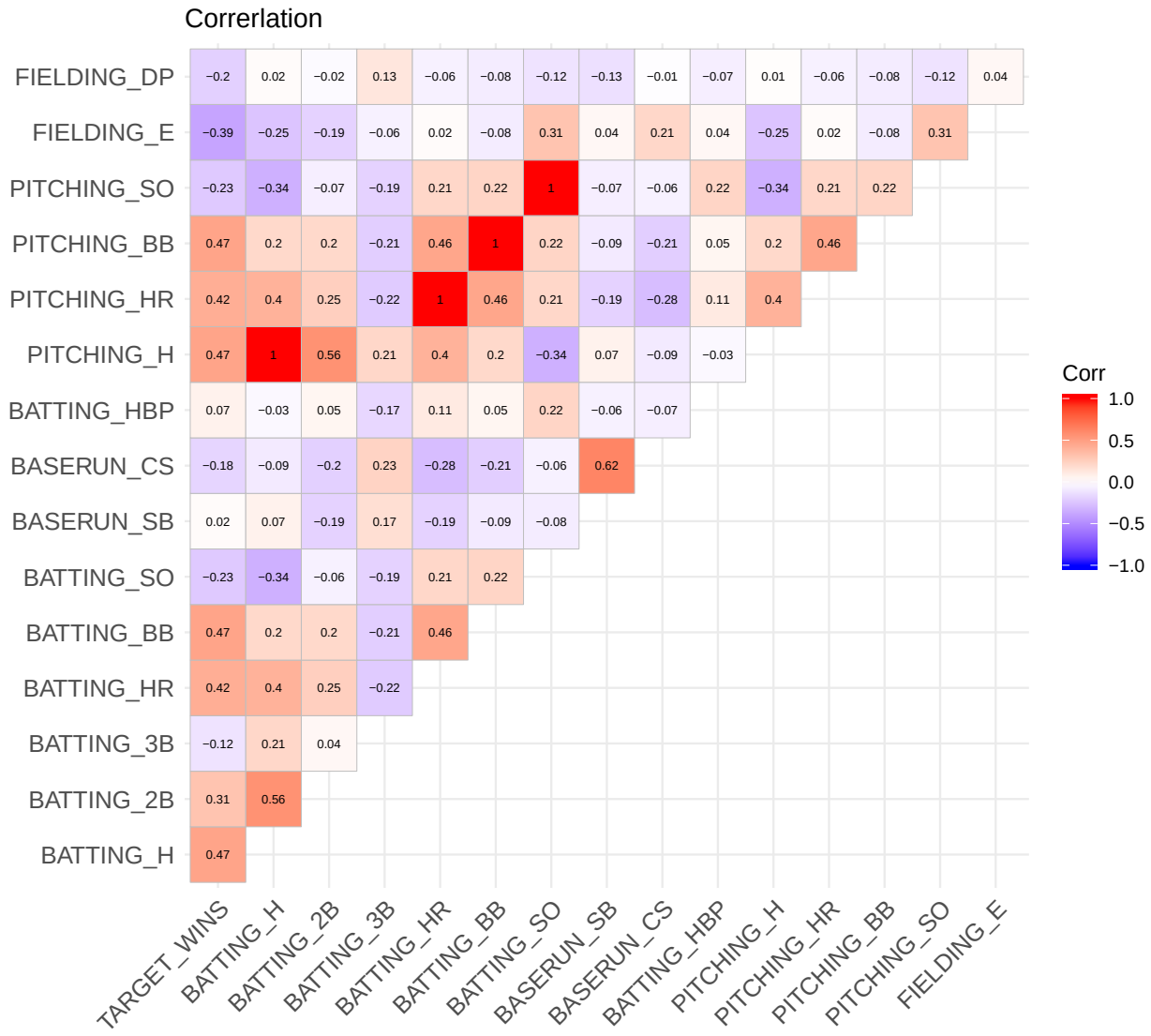
var	s	n	mean	sd med	ian	trimmed	mad mi	n m	ax ran	ge	sk
TARGET_WINS	1	2276	80.79086	15.75215	82.0	81.31229	14.8260	0	146	146	-0.39
BATTING_H	2	2276	1469.26977	144.59120	1454.0	1459.04116	114.1602	891	2554	1663	1.57
BATTING_2B	3	2276	241.24692	46.80141	238.0	240.39627	47.4432	69	458	389	0.21
BATTING_3B	4	2276	55.25000	27.93856	47.0	52.17563	23.7216	0	223	223	1.10
BATTING_HR	5	2276	99.61204	60.54687	102.0	97.38529	78.5778	0	264	264	0.18
BATTING_BB	6	2276	501.55888	122.67086	512.0	512.18331	94.8864	0	878	878	-1.02
BATTING_SO	7	2174	735.60534	248.52642	750.0	742.31322	284.6592	0	1399	1399	-0.29
BASERUN_SB	8	2145	124.76177	87.79117	101.0	110.81188	60.7866	0	697	697	1.97
BASERUN_CS	9	1504	52.80386	22.95634	49.0	50.35963	17.7912	0	201	201	1.97
BATTING_HBP	10	191	59.35602	12.96712	58.0	58.86275	11.8608	29	95	66	0.31
PITCHING_H	11	2276	1779.21046	1406.84293	1518.0	1555.89517	174.9468	1137	30132	28995	10.32
PITCHING_HR	12	2276	105.69859	61.29875	107.0	103.15697	74.1300	0	343	343	0.28
PITCHING_BB	13	2276	553.00791	166.35736	536.5	542.62459	98.5929	0	3645	3645	6.74
PITCHING_SO	14	2174	817.73045	553.08503	813.5	796.93391	257.2311	0	19278	19278	22.17
FIELDING_E	15	2276	246.48067	227.77097	159.0	193.43798	62.2692	65	1898	1833	2.99
FIELDING_DP	16	1990	146.38794	26.22639	149.0	147.57789	23.7216	52	228	176	-0.38

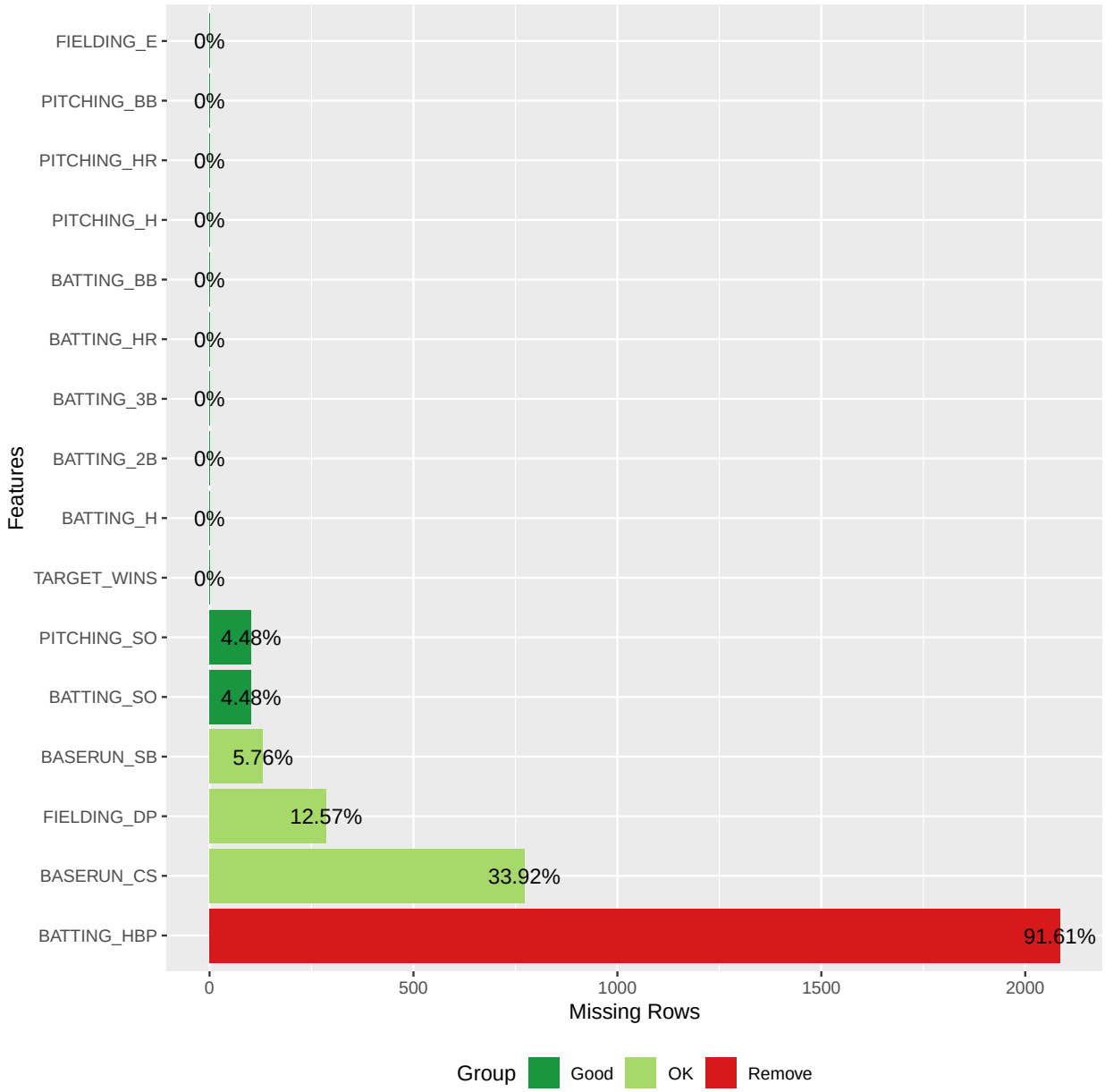
- Data visualization




Boxplot
FIELDING_DP
FIELDING_E
PITCHING_SO
PITCHING_BB
PITCHING_HR
PITCHING_H
BATTING_HBP
BASERUN_CS
BASERUN_SB
BATTING_SO
BATTING_BB
BATTING_HR
BATTING_3B
BATTING_2B
BATTING_H
TARGET_WINS
10
100
1000
10000
log transformed freq.


Scatterplot
BATTING_H
BATTING_2B
BATTING_3B
BATTING_HR
BATTING_BB
BATTING_SO
BASERUN_SB
BASERUN_CS
BATTING_HBP
PITCHING_H
PITCHING_HR
PITCHING_BB
PITCHING_SO
FIELDING_E
FIELDING_DP
Number of Wins


Correrlation
FIELDING_DP
FIELDING_E
PITCHING_SO
PITCHING_BB
PITCHING_HR
PITCHING_H
BATTING_HBP
BASERUN_CS
BASERUN_SB
BATTING_SO
BATTING_BB
BATTING_HR
BATTING_3B
BATTING_2B
BATTING_H
TARGET_WINS
BATTING_H
BATTING_2B
BATTING_3B
BATTING_HR
BATTING_BB
BATTING_SO
BASERUN_SB
BASERUN_CS
BATTING_HBP
PITCHING_H
PITCHING_HR
PITCHING_BB
PITCHING_SO
FIELDING_E
Corr
1.0
0.5
0.0
−0.5
−1.0



2 Data preparation

2.1 Missing Values

1) `Hit by pitch` missing 91.61% .

- Missing values can lead to errors and bias into a model. Fixing and imputation may help or make it worse.
- When it is just a few observations missing, modifications can be made, however, with 91.61% is a large proportion and could distort the modelling later on that it is better to ignore this column.
- The Data explorer package recommends to remove.
- From LMR: Missing Completely at Random (MCAR) The probability that a value is missing is the

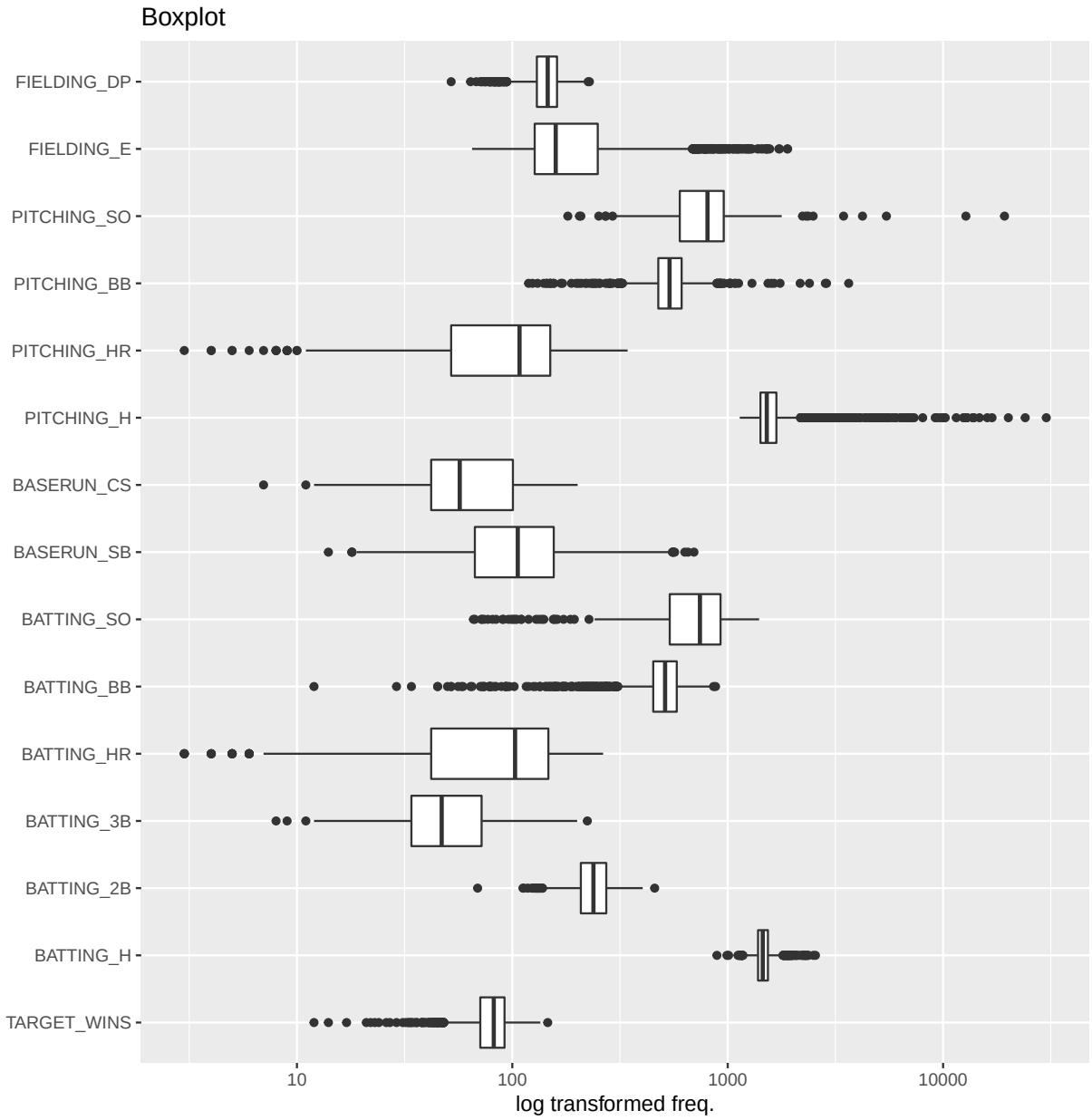
same for all cases. If we simply delete all cases with missing values from the analysis, we will cause no bias, although we may lose some information.

- However, there is no consensus on when to exclude missing data. Some argue that missing data more than 10% can lead to bias. Others argue that missing data patterns have greater impact than the proportion.

2) `Pitching_SO` and `Batting_SO` are missing exact same proportion 4.48% and are missing in the same observations.

2.2 NA Imputation

```
## TARGET_WINS   BATTING_H  BATTING_2B  BATTING_3B  BATTING_HR  BATTING_BB
##           0           0           0           0           0           0
##  BATTING_SO  BASERUN_SB  BASERUN_CS  PITCHING_H PITCHING_HR PITCHING_BB
##         102         131         772           0           0           0
## PITCHING_SO  FIELDING_E FIELDING_DP
##         102           0         286
```



2.3 Feature Engineering

. . .