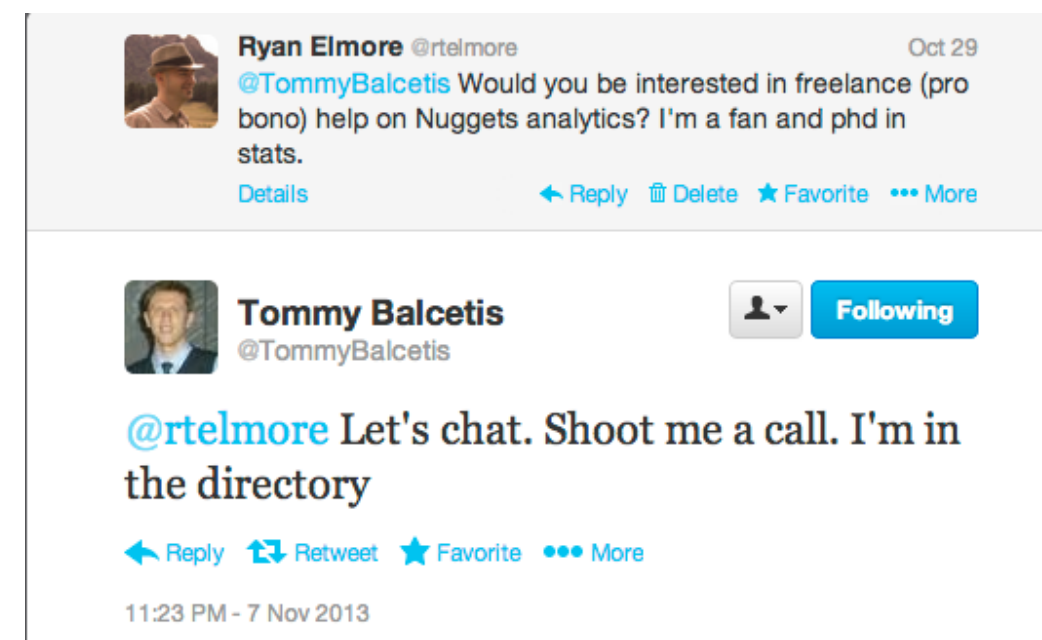


A Logistic Regression Approach to Predicting Who Will Make the NBA Playoffs

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In 2015, Research Starts with a Tweet...

Question: What is the probability that the Denver Nuggets will make the playoffs given their record at 35 games?



Why is this important? From nba.com (last year)...

- 2015
- Jan. 5 -- 10-day contracts can now be signed
- Jan. 10 -- All contracts are guaranteed for remainder of the season
- Jan. 15 -- NBA Global Games (Knicks vs. Bucks in London, England at The O2)
- Feb. 13-15 -- 2015 NBA All-Star (Brooklyn and New York)
- Feb. 19 -- 2015 NBA Trade Deadline (3 p.m. ET)

Data

Dependent variable: playoffs or not

Independent variables: record, cumulative point differential, strength of schedule (away games, back to back games), organizational stability (prior-year success)

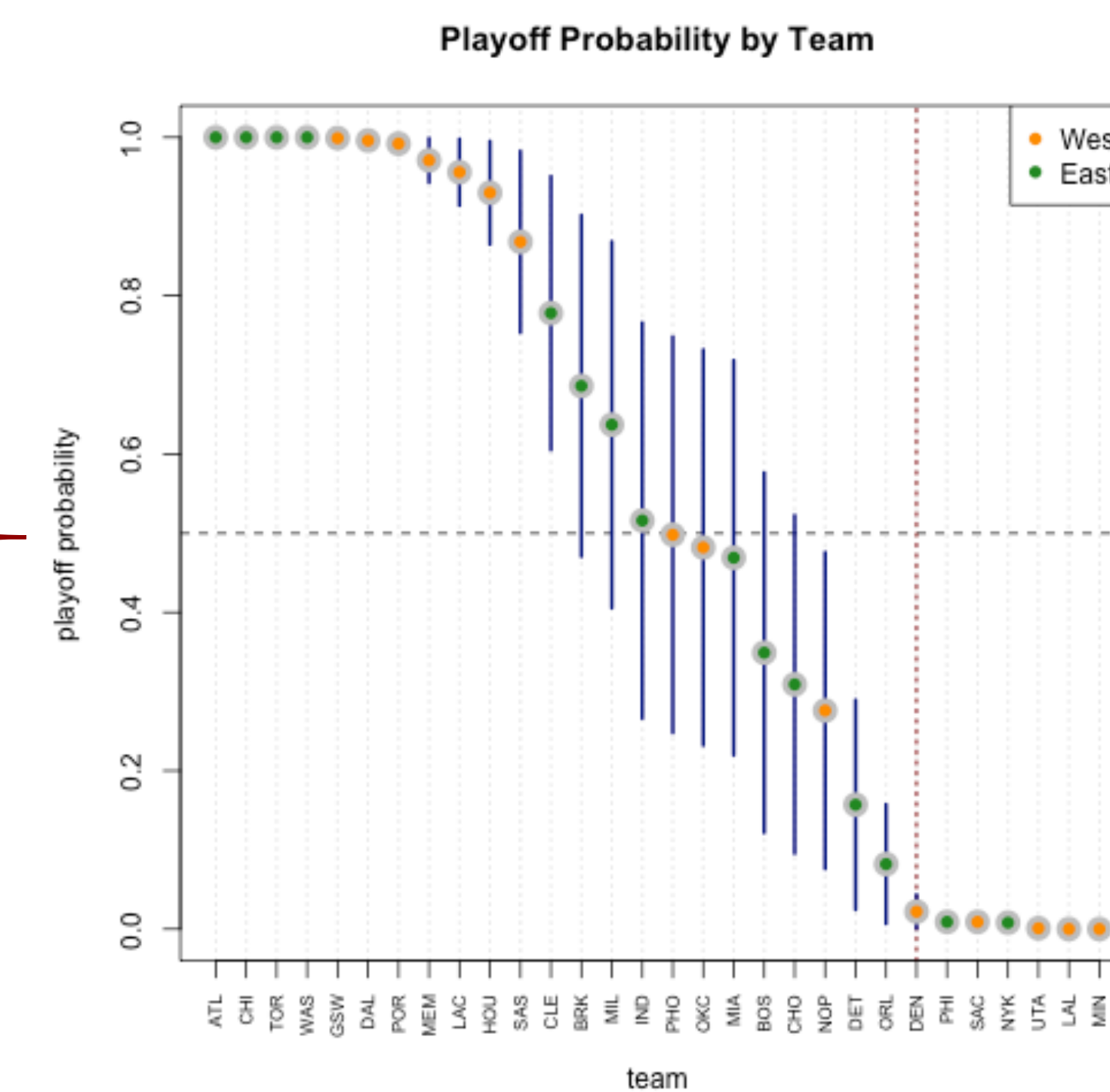
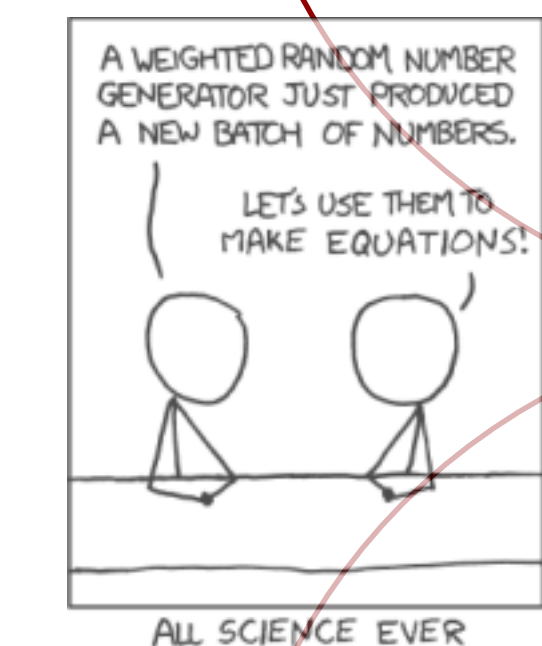
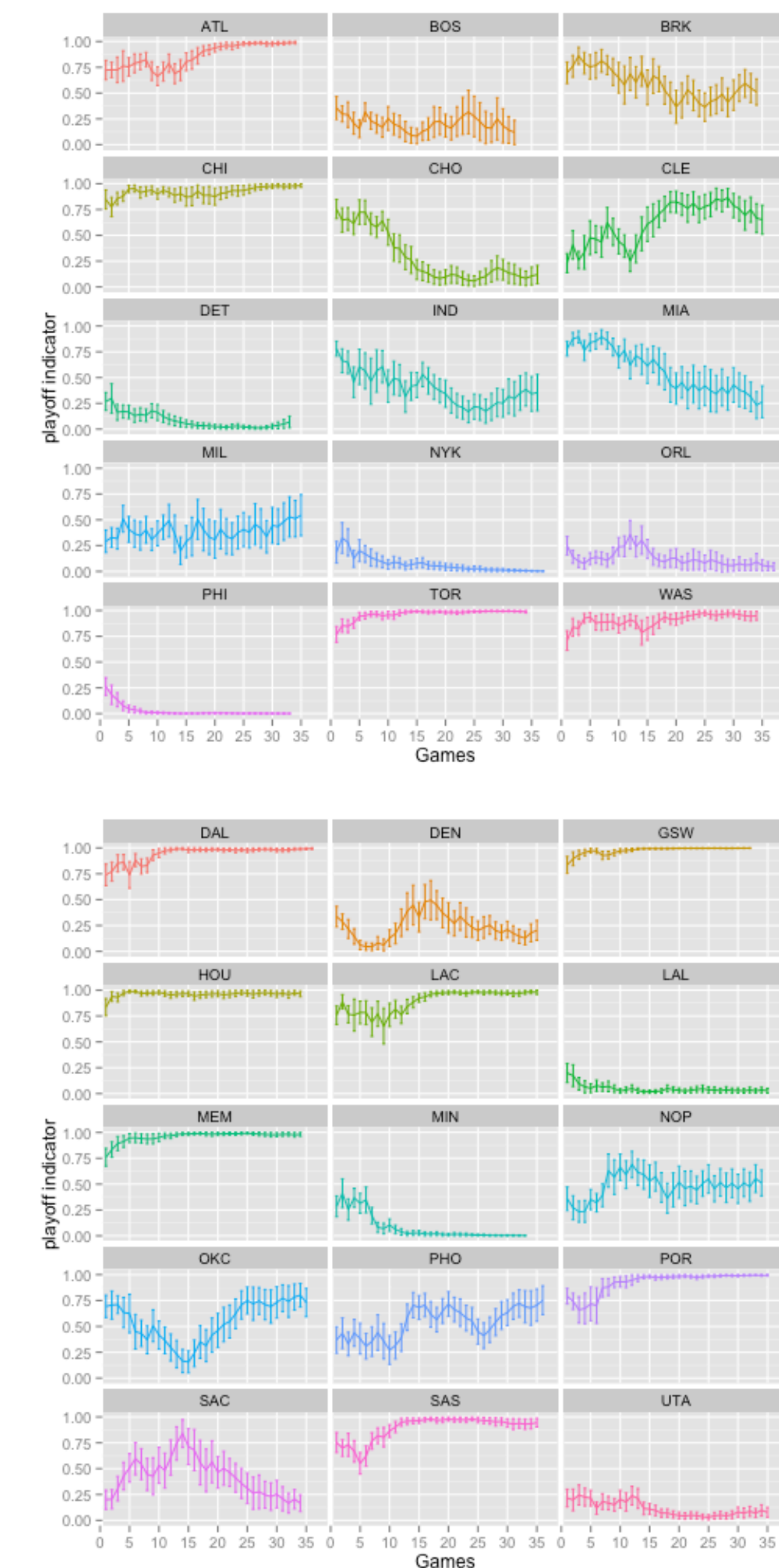
Date	Opponent	Tm	Opp	W	L	Streak	Notes
1 Wed, Dec 23, 2015	Box Score @ Phoenix	W	89	79	1	0	W 1
2 Sat, Nov 7, 2015	Box Score @ Oklahoma City Thunder	L	88	102	1	1	L 1
3 Mon, Nov 2, 2015	Box Score @ Sacramento Kings	L	105	110	1	2	L 2
4 Wed, Nov 4, 2015	Box Score @ Sacramento Kings	L	109	131	1	3	L 3
5 Fri, Nov 7, 2015	Box Score @ Cleveland Cavaliers	L	101	110	1	4	L 4
6 Sun, Nov 9, 2015	Box Score @ Portland Trail Blazers	L	100	116	1	5	L 5
7 Wed, Nov 12, 2015	Box Score @ Portland Trail Blazers	L	113	130	1	6	L 6
8 Fri, Nov 14, 2015	Box Score @ Indiana Pacers	W	108	87	2	6	W 1
9 Sun, Nov 16, 2015	Box Score @ New York Knicks	L	93	109	2	7	L 1
10 Mon, Nov 17, 2015	Box Score @ Cleveland Cavaliers	W	106	97	3	7	W 1
11 Wed, Nov 19, 2015	Box Score @ Oklahoma City Thunder	W	107	100	4	7	W 2
12 Fri, Nov 21, 2015	Box Score @ New Orleans Pelicans	W	117	97	5	7	W 3
13 Sun, Nov 23, 2015	Box Score @ Los Angeles Lakers	W	101	94	6	7	W 4
14 Tue, Nov 25, 2015	Box Score @ Chicago Bulls	W	114	109	7	7	W 5
15 Wed, Nov 26, 2015	Box Score @ Phoenix Suns	L	112	120	7	8	L 1
16 Fri, Nov 28, 2015	Box Score @ Phoenix Suns	W	122	97	8	8	W 1
17 Mon, Dec 1, 2015	Box Score @ Utah Jazz	W	103	101	9	8	W 2
18 Tue, Dec 2, 2015	Box Score @ Portland Trail Blazers	L	103	105	9	9	L 1
19 Fri, Dec 5, 2015	Box Score @ Washington Wizards	L	89	119	9	10	L 2
20 Sun, Dec 7, 2015	Box Score @ Atlanta Hawks	L	84	96	9	11	L 3

```
for (year in years) {
  for (team in teams) {
    ## Logic to handle team names
    GetNBASeasonTeamByYear(team, year)
    ## url <- paste(.base.api,
    ##             team, "/",
    ##             year,
    ##             "_games.html",
    ##             sep=" ")
    ## stats <- readHTMLTable(url)
  }
}
```

Modelling and Simulation Overview

$$\text{Regression Model: } \log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \dots + \beta_5 X_5$$

- p = probability of making playoffs
- X_1 = indicator of prior year playoffs ✓
- X_2 = wins - losses ✓
- X_3 = average point differential ✓
- X_4 = number of away games ✗
- X_5 = number of back-to-back games ✗



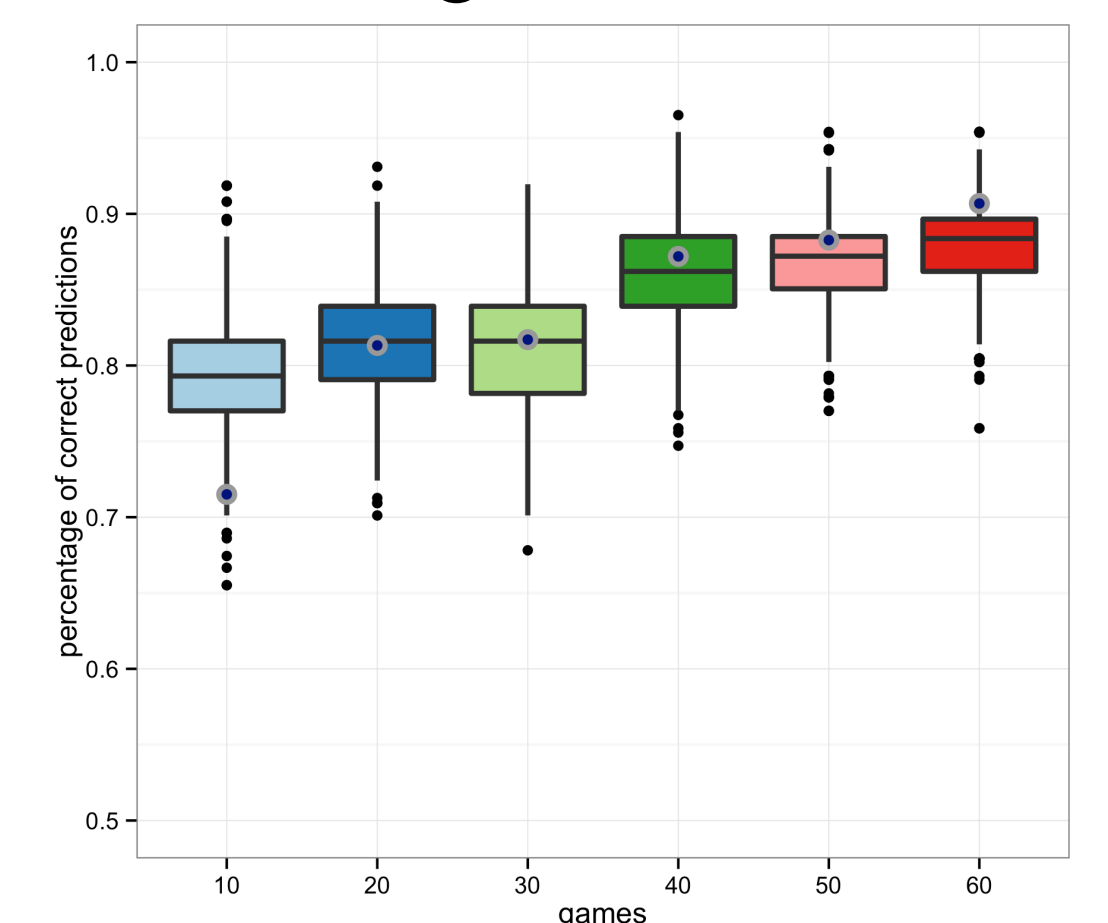
Conclusions

Let's be honest, we knew that the Nuggets were not going to make the playoffs without this analysis!

From Section 4.10 of Severini (2015):

... concepts such as the margin of error are still useful for understanding the role of randomness in sports statistics. However, such concepts should be viewed as guidelines rather than as strict results.

The methodology is generalizable to any number of games. But, is this better than just looking at the standings? Yes and no. No, the records at various dates tell a similar story. Yes, because we incorporate some notion of uncertainty into the predictions.



Future Work

GAM: Fit a general additive model to the logit, *i.e.*

$$\log\left(\frac{p}{1-p}\right) = s_1(X_1) + \dots + s_5(X_5)$$

where s_i are nonparametric, smooth functions.

Free Agency: Incorporate off-season movement into the prediction equations, *e.g.* use team salary information as a proxy.

Collaboration Opportunities?

If you're interested in working on this type of project, contact me at Ryan.Elmore@du.edu or @rtelmore, and check out the code repository at <https://github.com/rtelmore/Nuggets>.

Acknowledgements

The author would like to thank Tommy Balcetis, Manager of Basketball Analytics for the Denver Nuggets, for his contributions to this work.

