Is it time for an NBA expansion?*

My subtitle if needed

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First sentence. Second sentence. Third sentence. Fourth sentence.

Table of contents

*Code and data are available at: https://github.com/Mezhi18/NBAExpansion .

1 Introduction

You can and should cross-reference sections and sub-sections. We use R Core Team (2023) and Wickham et al. (2019).

The remainder of this paper is structured as follows. Section 2....

Gebru et al. (2021)

2 Data

Talk more about it.

Talk way more about it.

3 Model

The goal of our modelling strategy is twofold. Firstly,...

Here we briefly describe the Bayesian analysis model used to investigate... Background details and diagnostics are included in Appendix B.

3.1 Model set-up

Define y_i as the average number of points per game scored by a team through out the NBA season. Then α is the average assists per game, ρ the average rebounds per game, β is blocks per game, ψ is steals per game and lastly, τ is turnovers per game, ι is the year, and η is the number of teams.

$$
\begin{aligned}
y_i|\mu_i, \sigma &\sim \text{Normal}(\mu_i, \sigma) && (1)\\
\mu_i &= \alpha + \rho_i + \beta_i + \xi_i + \tau_i + \iota_i + \eta_i && (2)\\
\alpha &\sim \text{Normal}(0, 2.5) && (3)\\
\rho &\sim \text{Normal}(0, 2.5) && (4)\\
\beta &\sim \text{Normal}(0, 2.5) && (5)\\
\psi &\sim \text{Normal}(0, 2.5) && (6)\\
\tau &\sim \text{Normal}(0, 2.5) && (7)\\
\iota &\sim \text{Normal}(0, 2.5) && (8)\\
\eta &\sim \text{Normal}(0, 2.5) && (9)\\
\sigma &\sim \text{Exponential}(1) && (10)\\
& && (11)
\end{aligned}
$$

We run the model in R (R Core Team 2023) using the `rstanarm` package of Goodrich et al. (2022). We use the default priors from `rstanarm`.

3.1.1 Model justification

We expect a positive relationship between the size of the wings and time spent aloft. In particular…

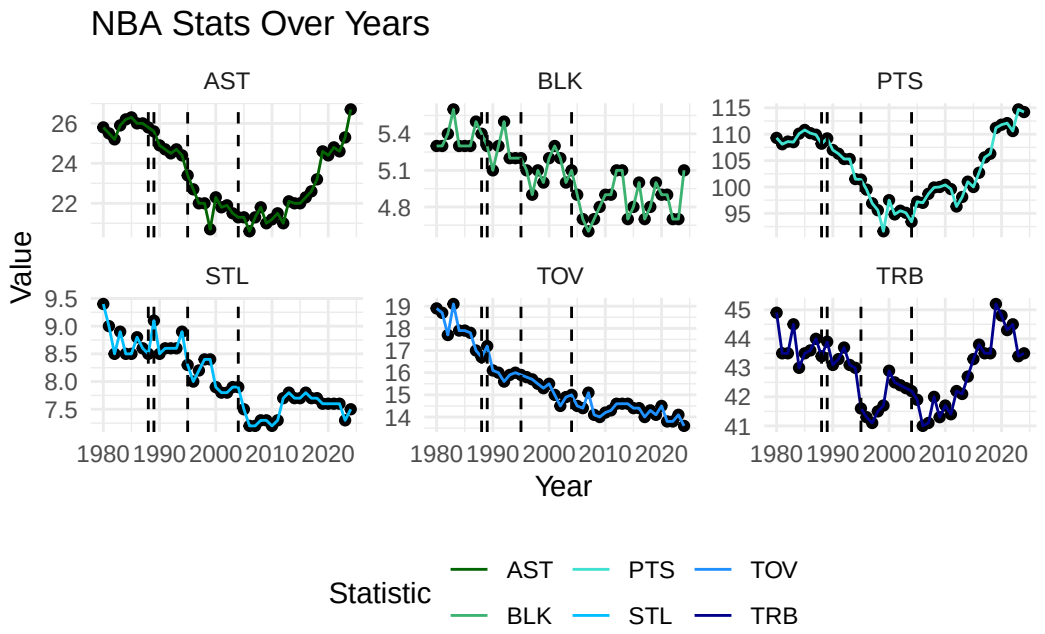


Figure 1: NBA Statistics from 1980

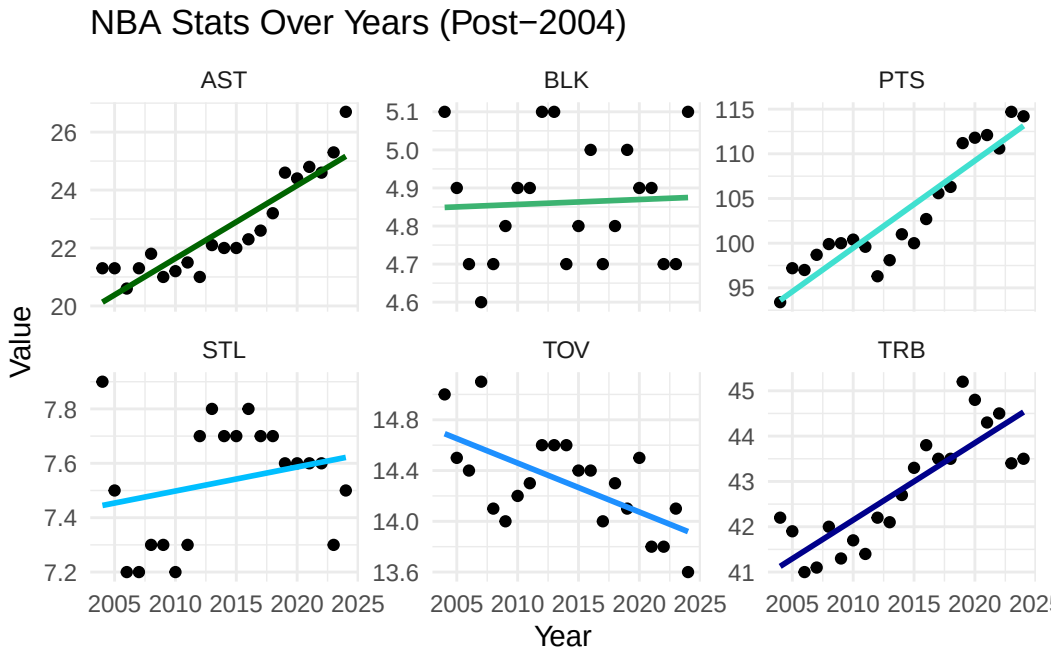
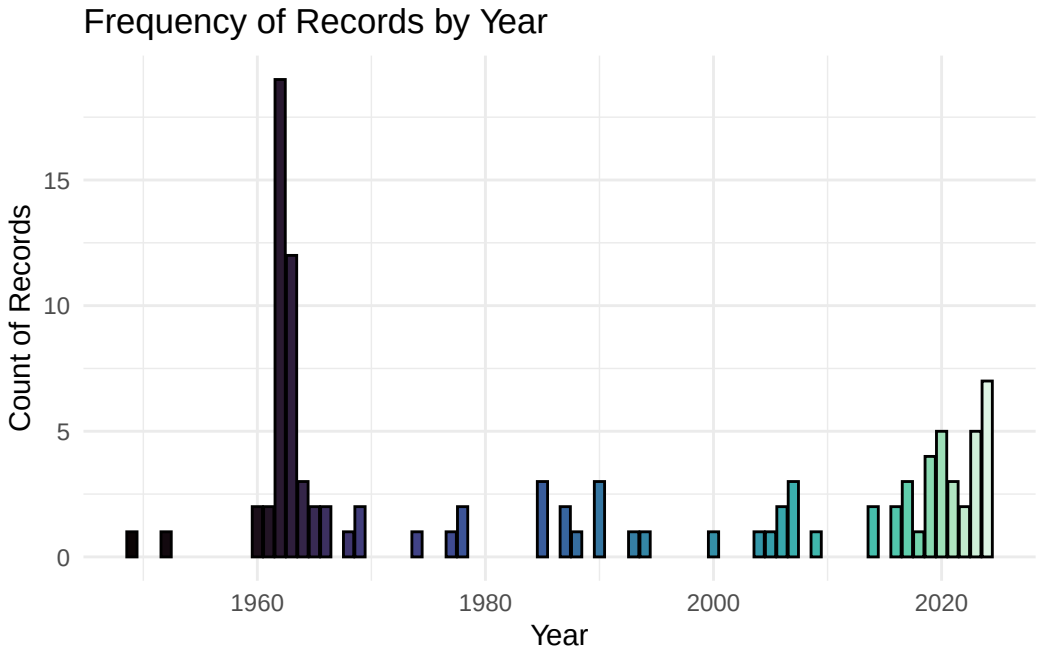


Figure 2: NBA Stats Since 2004

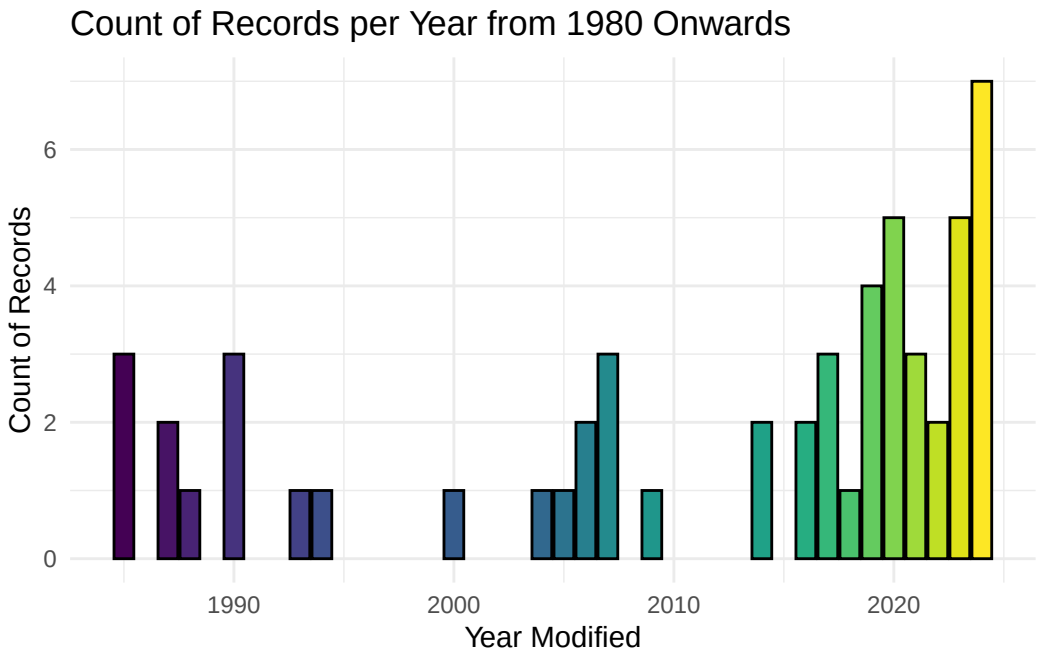
4 Results




```
data_1980_onwards <- scoring_data %>%
  filter(Year >= 1980)

ggplot(data_1980_onwards, aes(x = Year, fill = as.factor(Year))) +
  geom_histogram(stat = "count", bins = length(unique(data_1980_onwards$Year)), color = "bla
  scale_fill_viridis(discrete = TRUE) +  # Apply viridis color scale for discrete data
  labs(title = "Count of Records per Year from 1980 Onwards",
       x = "Year Modified",
       y = "Count of Records") +
  theme_minimal() +
  theme(legend.position = "none")
```

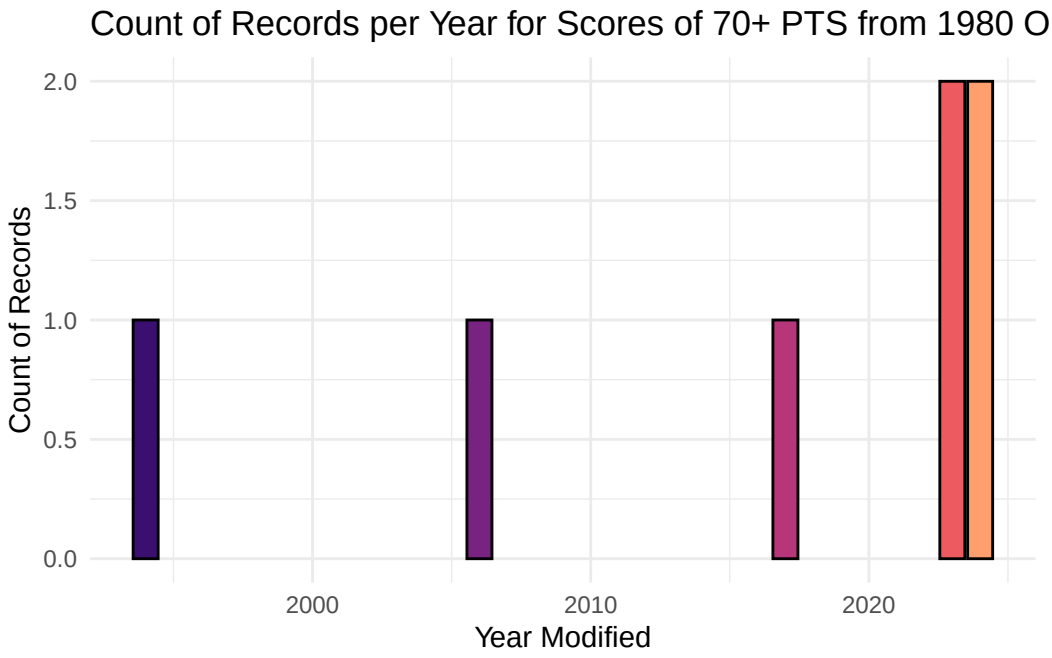
```
Warning in geom_histogram(stat = "count", bins =
length(unique(data_1980_onwards$Year)), : Ignoring unknown parameters:
`binwidth`, `bins`, and `pad`
```

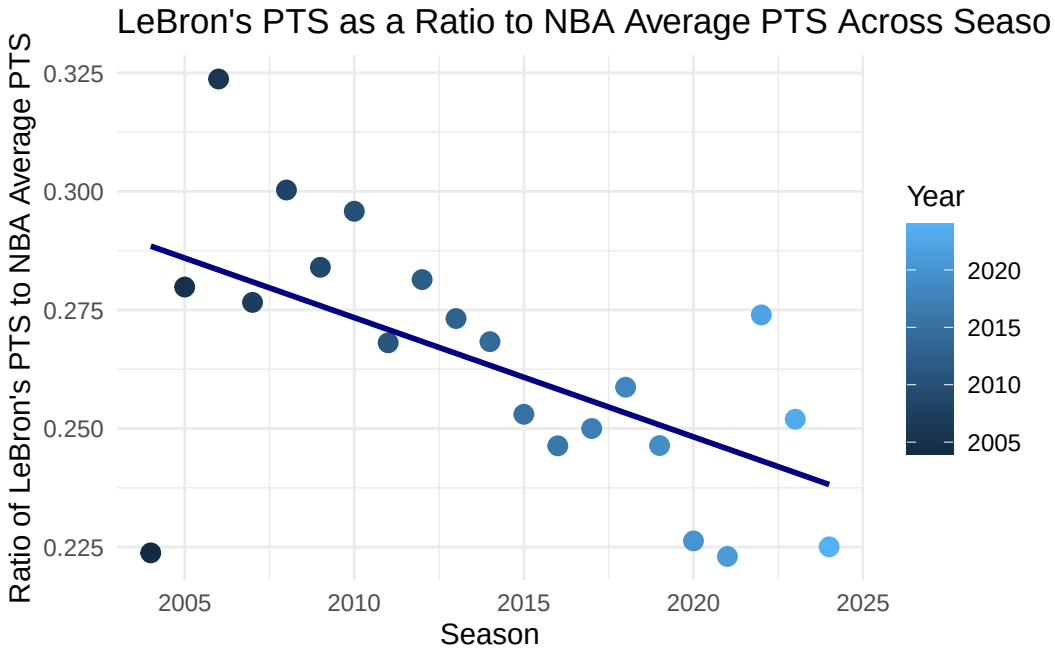


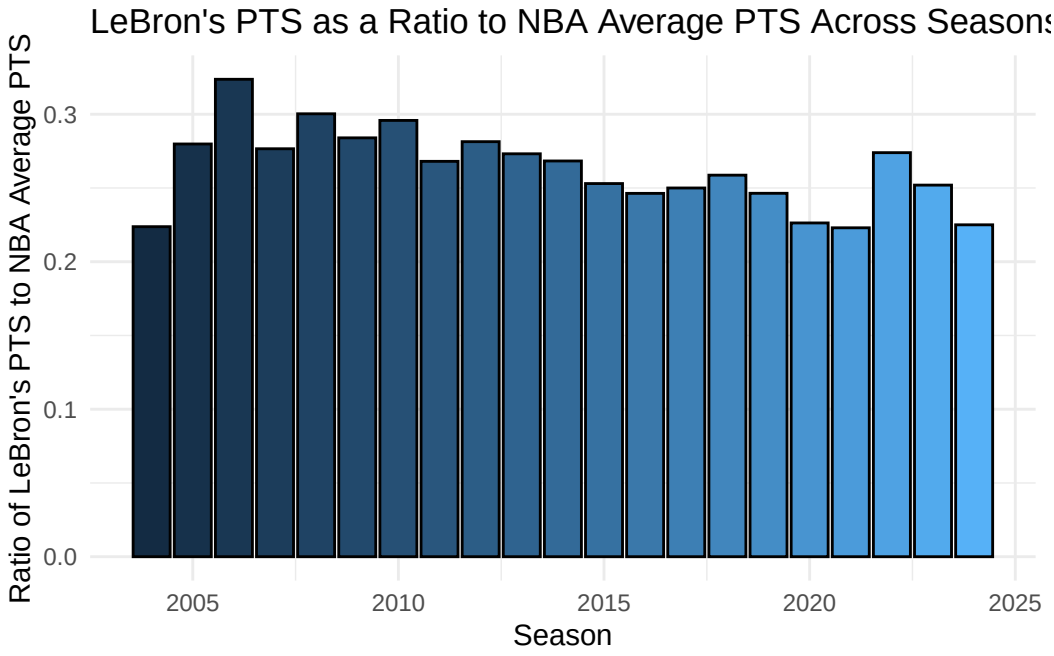

```
##
data_1980_70pts_plus <- scoring_data %>%
  filter(Year >= 1980, PTS >= 70)

ggplot(data_1980_70pts_plus, aes(x = Year, fill = factor(Year))) +
  geom_histogram(stat = "count", bins = length(unique(data_1980_70pts_plus$Year)), color = "
  scale_fill_viridis_d(begin = 0.2, end = 0.8, direction = 1, option = "magma") +  # Discrete
  labs(title = "Count of Records per Year for Scores of 70+ PTS from 1980 Onwards",
       x = "Year Modified",
       y = "Count of Records") +
  theme_minimal() +
  theme(legend.position = "none")
```

```
Warning in geom_histogram(stat = "count", bins =
length(unique(data_1980_70pts_plus$Year)), : Ignoring unknown parameters:
`binwidth`, `bins`, and `pad`
```


Count of Records per Year for Scores of 70+ PTS from 1980 O
Count of Records
2.0
1.5
1.0
0.5
0.0
2000
2010
2020
Year Modified


LeBron's PTS as a Ratio to NBA Average PTS Across Seaso
Ratio of LeBron's PTS to NBA Average PTS
0.325
0.300
0.275
0.250
0.225
2005
2010
2015
2020
2025
Season
Year
2020
2015
2010
2005



5 Discussion

5.1 First discussion point

If my paper were 10 pages, then should be be at least 2.5 pages. The discussion is a chance to show off what you know and what you learnt from all this.

5.2 Second discussion point

5.3 Third discussion point

5.4 Weaknesses and next steps

Weaknesses and next steps should also be included.

Appendix

A Additional data details

B Model details

Linear NBA Model

B.1 Posterior predictive check

B.2 Diagnostics

	Points Model
(Intercept)	4.82
	(137.00)
Year	0.02
	(0.07)
AST	3.26
	(0.24)
TRB	1.09
	(0.38)
STL	−3.16
	(0.93)
BLK	−6.47
	(1.53)
TOV	0.18
	(0.56)
Num_Teams	−0.26
	(0.35)
Num.Obs.	45
R2	0.961
R2 Adj.	0.953
AIC	164.7
BIC	181.0
Log.Lik.	−73.374
RMSE	1.24

References

Gebru, Timnit, Jamie Morgenstern, Briana Vecchione, Jennifer Wortman Vaughan, Hanna Wallach, Hal Daumé III, and Kate Crawford. 2021. "Datasheets for Datasets." *Communications of the ACM* 64 (12): 86–92.

Goodrich, Ben, Jonah Gabry, Imad Ali, and Sam Brilleman. 2022. "Rstanarm: Bayesian Applied Regression Modeling via Stan." https://mc-stan.org/rstanarm/.

R Core Team. 2023. *R: A Language and Environment for Statistical Computing*. Vienna, Austria: R Foundation for Statistical Computing. https://www.R-project.org/.

Wickham, Hadley, Mara Averick, Jennifer Bryan, Winston Chang, Lucy D'Agostino McGowan, Romain François, Garrett Grolemund, et al. 2019. "Welcome to the tidyverse." *Journal of Open Source Software* 4 (43): 1686. https://doi.org/10.21105/joss.01686.