Reclassifying Underutilized Pitchers Using Machine Learning

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Prompt

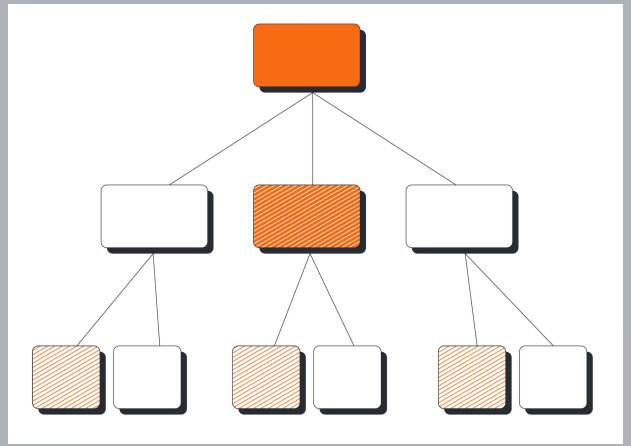
- What are characteristics that factor into a successful starter and a successful reliever?
- Which players show a positive production change if their role was switched?
- Contextually what players should change roles?

Methodology

- Selected ERA as measure of pitcher success
- Used the provided Baseball Savant and Fangraphs data to select possible predictors
- Created 2 preliminary models
- Pruned back each model to optimally reduce error
    - xgb.importance()
    - Remove low gain variables
- Used final models to predict player ERA in role switch

XGBoost

- Boosting is similar to random forest
- Random forest has each tree built independently on a bootstrap of the original data
- Boosting uses full data to build each tree, which are built consecutively and depend on the previous tree
- Use of XGBoost adds distinct advantages



Model Results

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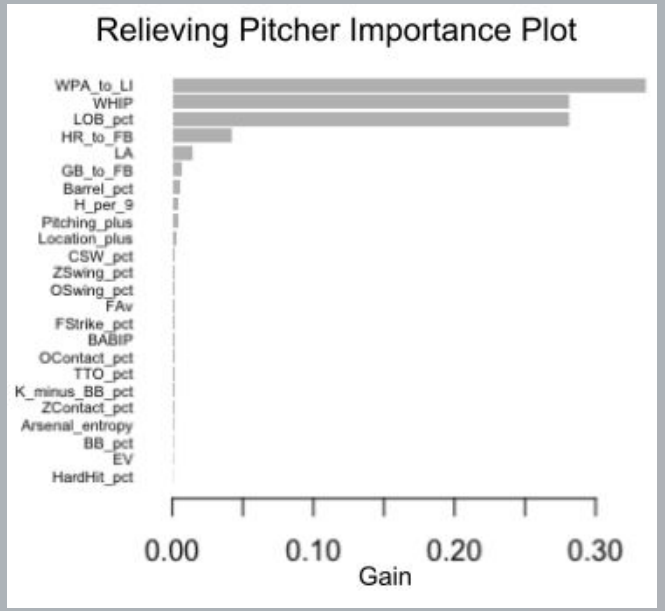
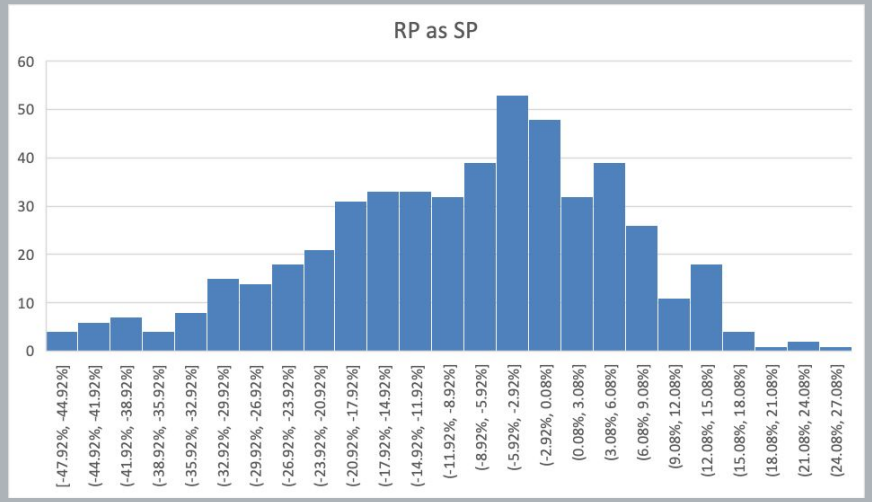


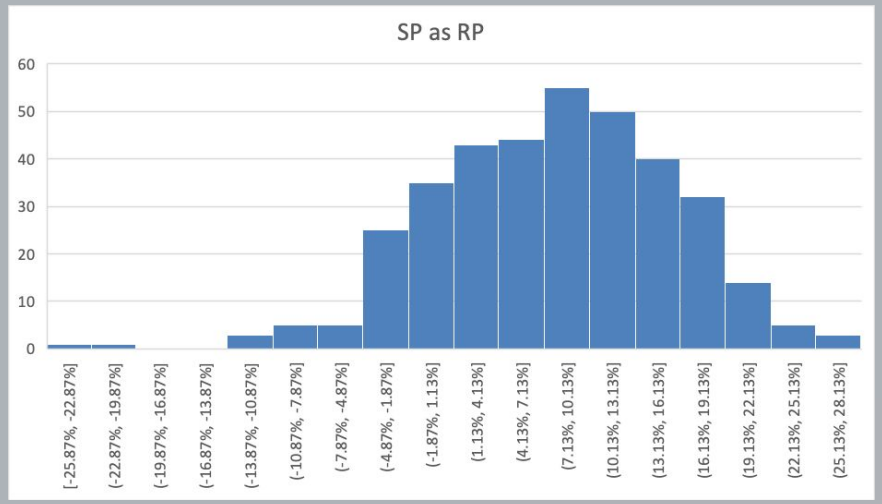
Percent Change

Name	Season	RP ERA	Predicted SP ERA	% Change
Gregory Soto	2023	4.62	3.51	24.17%
Tony Watson	2021	3.92	3.02	23.09%
Tyler Kinley	2021	4.73	3.72	21.41%
Heath Hembree	2021	5.59	4.56	18.43%
Will Smith	2023	4.40	3.65	16.91%
Josh Sborz	2023	5.50	4.64	15.73%
Jovani Moran	2023	5.31	4.48	15.64%
Andrés Machado	2023	5.22	4.41	15.61%
Tyler Duffey	2022	4.91	4.17	14.96%
Austin Davis	2022	6.52	5.55	14.90%

Name	Season	SP ERA	Predicted RP ERA	% Change
Zack Wheeler	2023	3.61	2.65	26.71%
Bobby Miller	2023	3.76	2.79	25.77%
German Marquez	2021	4.40	3.29	25.18%
Corbin Burnes	2023	3.39	2.56	24.62%
José Urquidy	2021	3.62	2.78	23.26%
Chris Bassitt	2021	3.15	2.42	23.15%
Zack Greinke	2023	5.02	3.86	22.95%
Spencer Strider	2023	3.86	3.00	22.17%
Sonny Gray	2021	4.19	3.28	21.68%
Charlie Morton	2021	3.34	2.63	21.49%

Distribution of Changes





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Profile One

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Kutter Crawford, Boston Red Sox SP

- Experienced mediocre success as SP, at best
- Projected to have a 3.92 ERA exclusively as RP
- Outperformed our model as RP in 2023 - albeit with much higher peripherals
    - 3.95/4.36 FIP and xFIP respectively

Kutter Crawford ERA by Role		
Year	ERA as SP	ERA as RP
2022	5.43	5.63
2023	4.51	1.66
Projected 2023 (full season)	N/A	3.92

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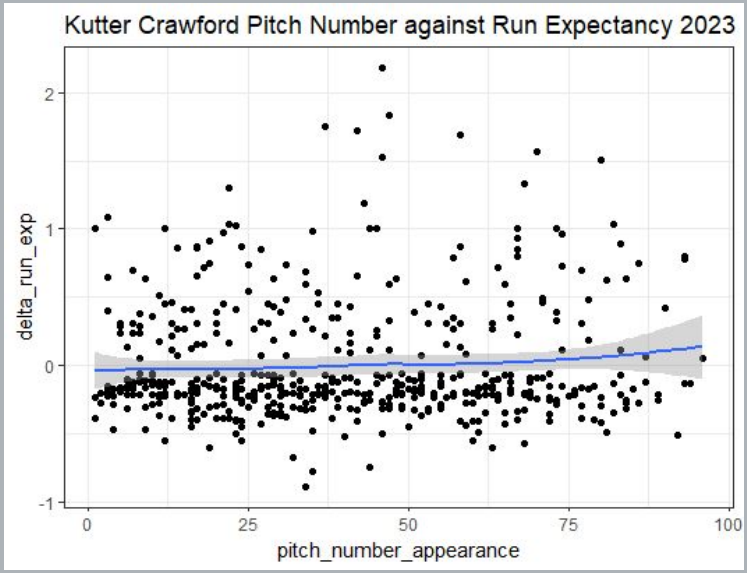
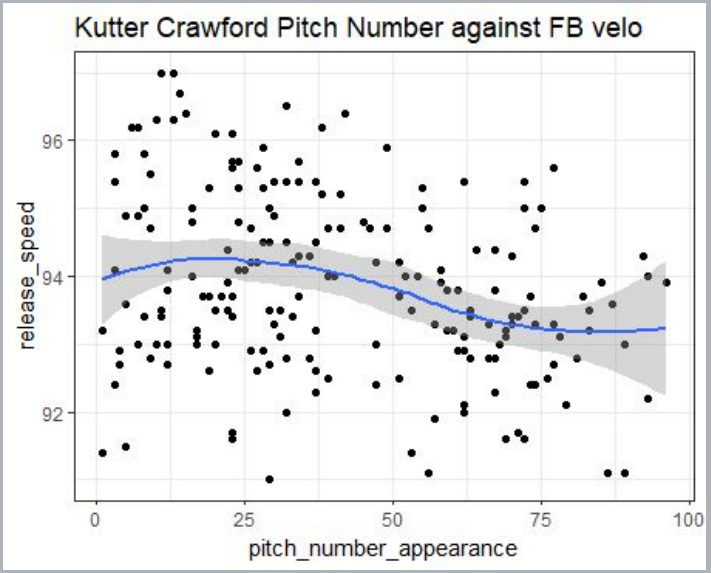
Kutter Crawford, Boston Red Sox SP

- Consistently performed worse as his outings went on in 2023
  - Run expectancy of events steadily increased as pitch count increased
- Average Fastball velocity peaks around 25 pitches and then steadily decreases
  - He could maximize the velocity and effectiveness of his Fastball were he to only be used in the bullpen





Final Recommendation

- These complementary findings, coupled with a lower modeled ERA, influenced our decision to have Crawford come exclusively out of the bullpen
- Having Crawford pitch 2-3 innings and bridge the gap between starters and late inning relievers allows him to maximize the velocity of his fastball while simultaneously preventing the struggles he experiences deeper into games

Profile Two

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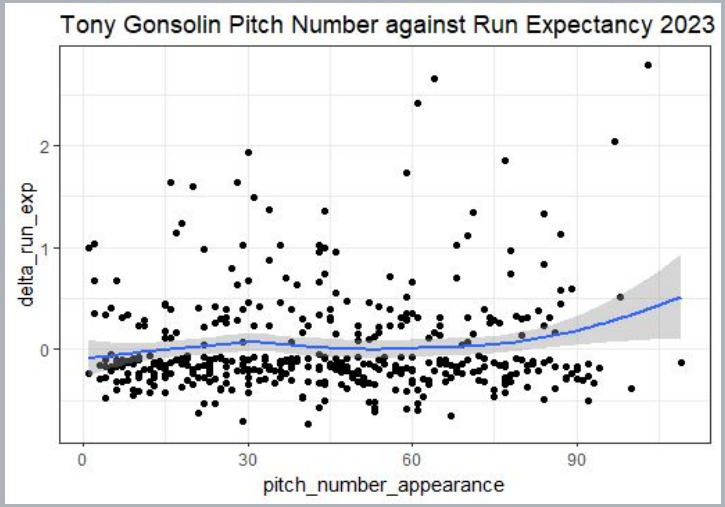
Tony Gonsolin, Los Angeles Dodgers SP

- Oft-injured, but has experienced success as SP since 2019
  - However, consistently had FIP/xFIP values around a full run above ERA
- Fell off significantly in 2023, partly due to injury
- Based on 2023 stats, was projected to have a 4.20 ERA as RP as compared to his actual 4.98 ERA as SP

Tony Gonsolin, Los Angeles Dodgers SP

- Run expectancy of events increased steadily after pitch count exceeded 60
- Injury history, shaky peripherals improved projected ERA as RP and decrease in performance later in outings all led to our recommendation to move Gonsolin to the bullpen
- Were he to have had a longer track record of success as a starter, we may not have made this recommendation
- Given the Dodgers' roster construction, this makes the most sense when he returns in 2025
- With Shohei Ohtani returning to the mound in 2025, it makes the most sense to deploy them in tandem



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Conclusions/Takeaways

- Recommending role changes is context-dependent within a team's roster
- LA and HR/FB% had a higher gain within our RP model
    - This reflects that low HR rates may be more important for RP than SP
- Many quality SP were modeled to have lower ERA as RP
    - Does not make much sense to recommend these pitchers switch roles when they already provide quality performance over many more innings
- Overall, there is much more nuance than just modeling performance when recommending role changes

Thank You!

Questions?

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