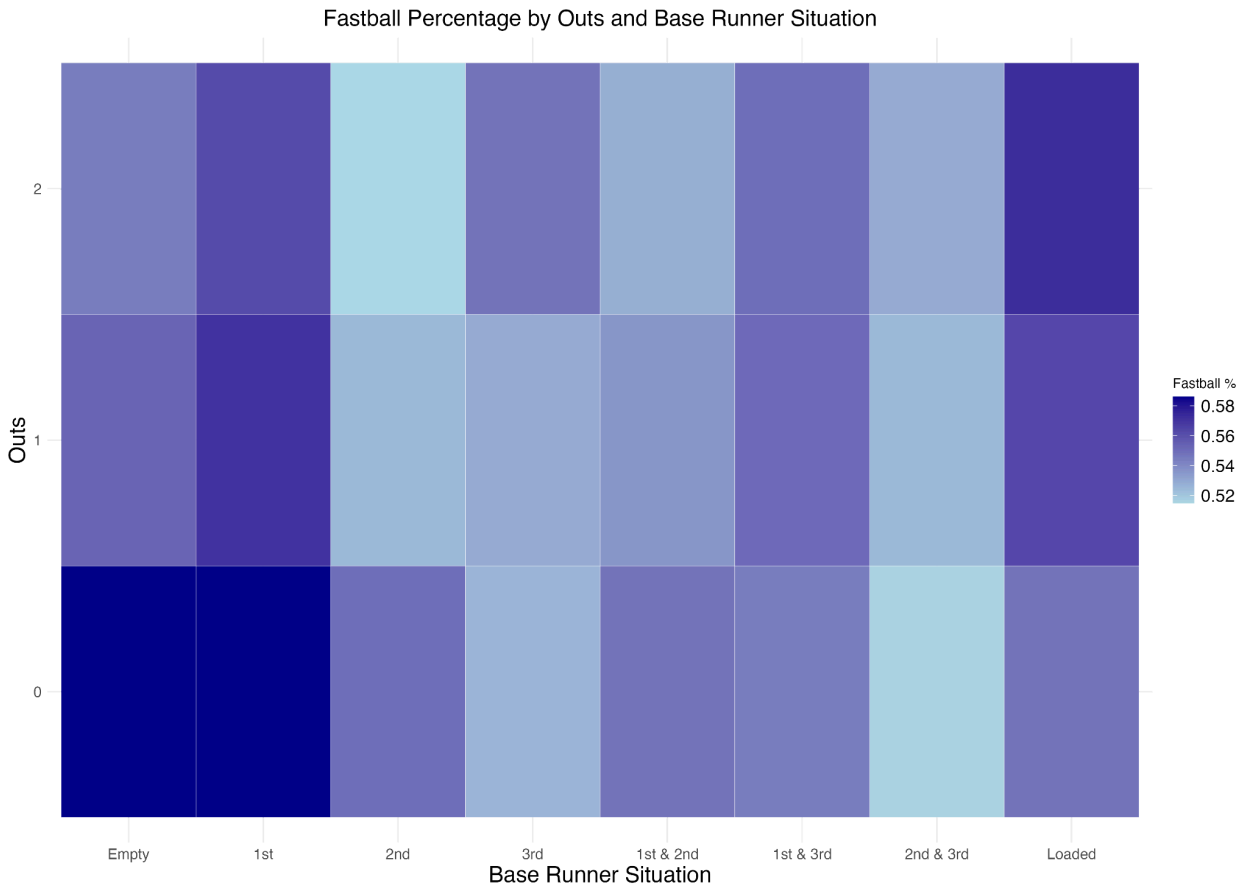
Predicting 2024 Batter Pitch Mixes

Project Overview

The goal of this project is to predict the pitch mixes that batters will face in the 2024 season. Specifically, pitch types have been categorized into fastballs, breaking balls, and off-speed pitches. Using data from the 2021, 2022, and 2023 seasons, I developed a predictive model that forecasts the percentage of each pitch type batters are likely to encounter in 2024. The model performed well in testing, with a prediction accuracy of approximately 2% for each pitch type.

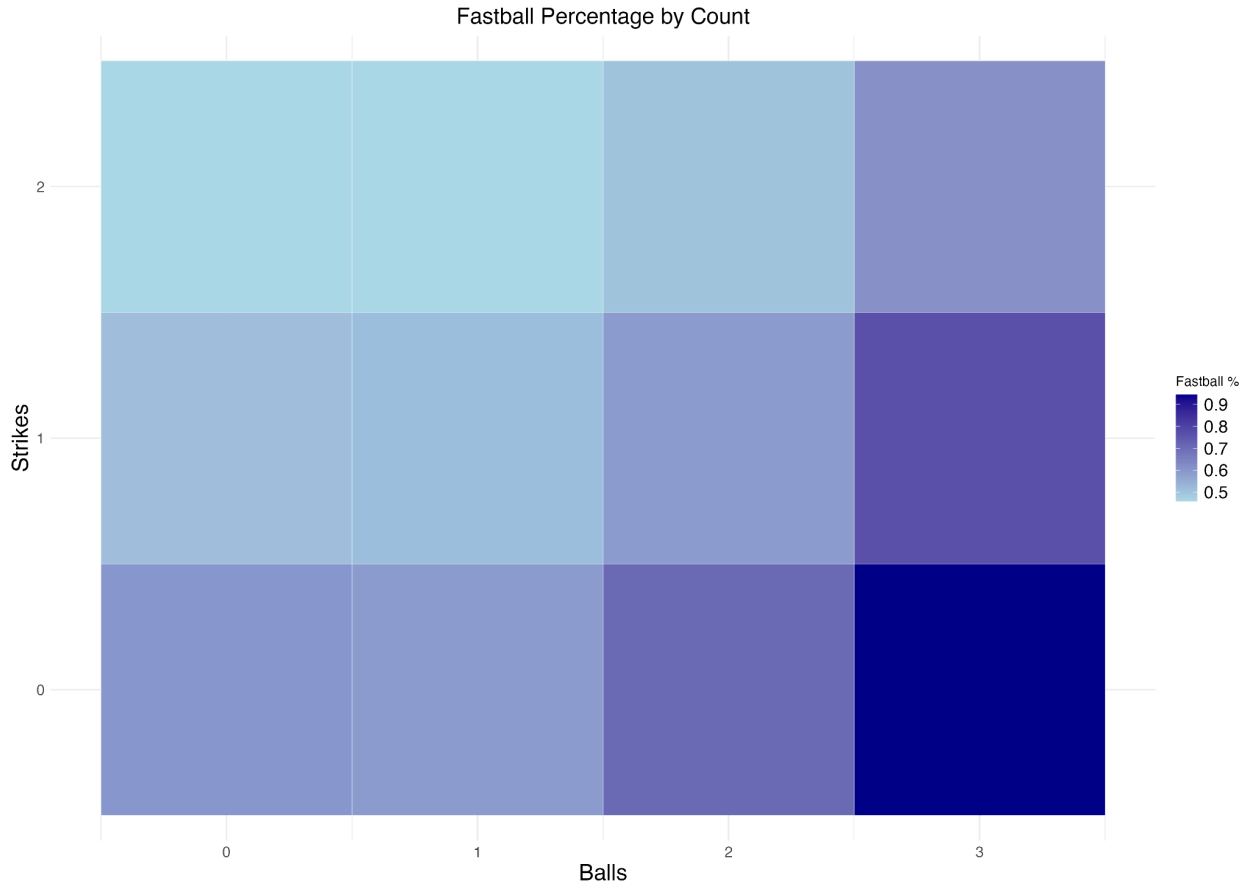
General Pitch Mix Trends

It's important to note that there are factors outside of the batter's control that can affect the probability of certain types of pitches being thrown. For example, game situations like the number of outs and baserunners can significantly influence a pitcher's decision making.



From the graph, we can see that fastball percentage is highest in situations like the start of an inning when there are no outs or when the bases are loaded. While some hitters may have had their pitch mix percentages altered by the specific situations they've faced, these effects likely balance out over the course of a full season. The key takeaway here is that certain game situations do alter pitch probabilities, and this should be taken into account when projecting pitch mixes for individual plate appearances. If a hitter is being used differently than in previous seasons, then we should be less confident in our pitch mix predictions for them. For example, if a batter is being deployed more frequently as a pinch-hitter in high-leverage situations or being slotted into a different part of the lineup, the situations they face may affect how often they see each type of pitch.

Additionally, the count has an effect on what pitch is likely to be thrown next.



In counts with more balls, pitchers are more likely to throw fastballs due to the increased need to throw a strike. So, hitters who work themselves into more favorable counts are likely to see a higher percentage of fastballs because they position themselves advantageously. Since hitters generally have control over the counts they find themselves in, there is stability to how this will affect their future pitch mixes. As a result, the projections should be able to account for the effect that the count has on pitch type percentages.

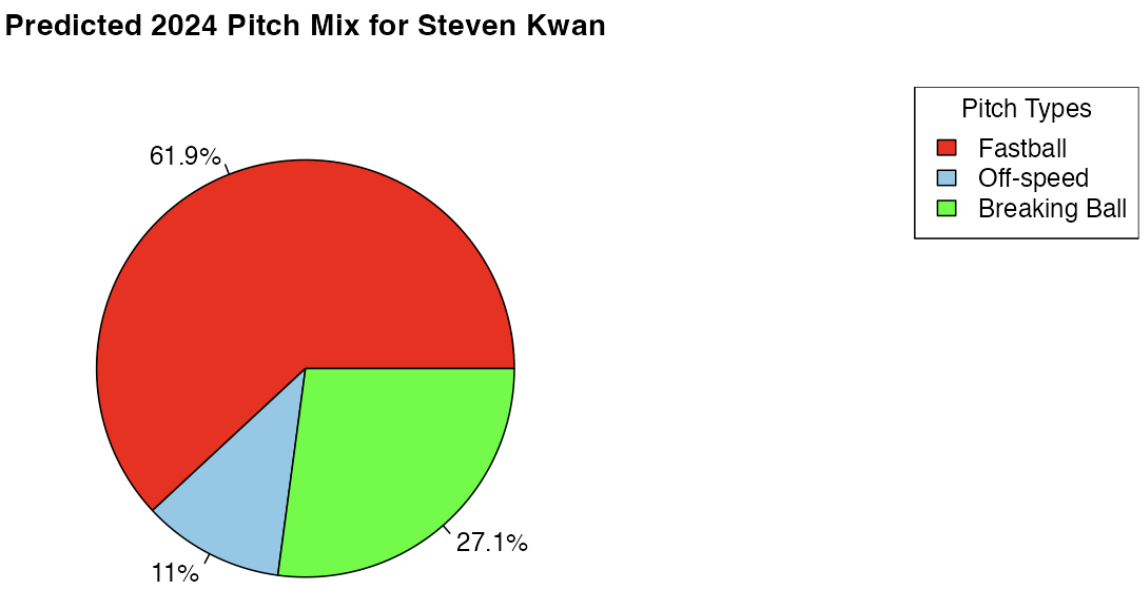
Of course, when predicting the pitch mix will face in a specific at-bat, we must also consider the pitcher's tendencies. Because these are season-long projections, some manual adjustment for a pitcher's arsenal must be done when trying to forecast how a certain plate appearance will play out. If a pitcher throws 90% fastballs, we shouldn't expect that to suddenly decrease drastically because we project a hitter to face only 50% fastballs across the season.

Although it might be reasonable to expect the pitcher's fastball percentage to lessen if a hitter typically faces less fastballs than average, we shouldn't cling to our season-long prediction of the hitter's pitch mix when he is placed in irregular situations, as there are some factors that our projections are incapable of fully accounting for.

Player Analysis

Now that we've considered some broad contextual factors that affect every hitter, let's look at some specific player-level projections.

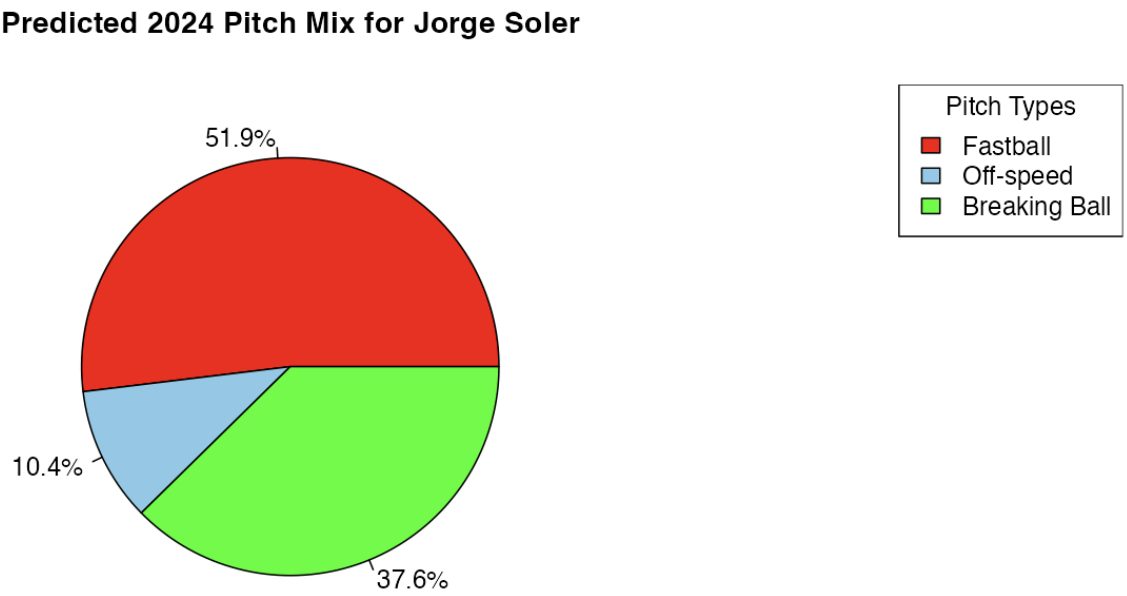
1. **Steven Kwan**



The Guardians leadoff hitter is predicted to face the third-highest fastball percentage of all qualified hitters in 2024, with a projection a full seven percentage points above league-average. There are likely multiple factors at play here as Kwan's tendencies as a batter are certainly responsible for motivating this projection. However, it's also important to note that Kwan leads off an inning at least once a game, which is the situation when fastball percentage is highest. So, if Kwan was to change spots in the lineup, it's possible that he would face a lower

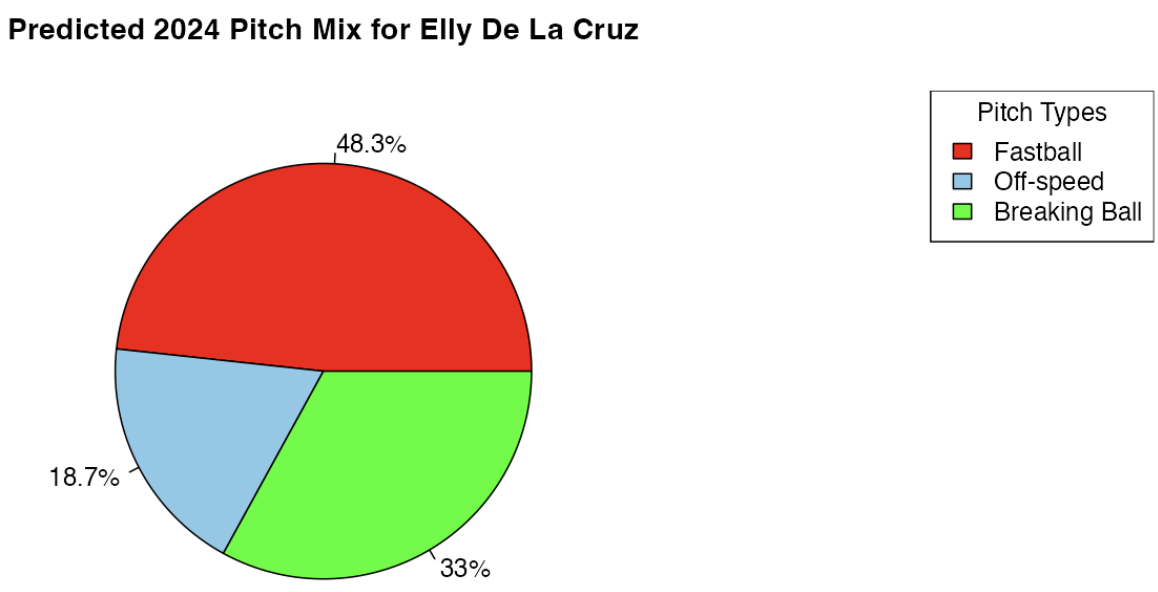
percentage of fastballs. Regardless, pitchers are likely to attack Kwan with fastballs at a much higher rate than average no matter the context, although it is important to note all the factors influencing this projection.

2. **Jorge Soler**



Another interesting case is Jorge Soler, who is projected to face six percentage points more breaking balls than average in 2024, which is the sixth-highest among all qualified hitters. This is largely because of how Soler has crushed fastballs over the course of his career and struggled relatively against breaking balls. Our projection system is able to pick up on how pitchers want to approach him, which informs Soler and his coaches that he should prioritize improving his approach against these types of pitches as he will likely see far more of them than average in 2024.

3. **Elly De La Cruz**



The Reds phenom is projected to face the third-lowest percentage of fastballs in 2024. Similarly to Soler, this is likely because of how well he fared against 4-Seam fastballs, Sinkers, and Cutters in his rookie season of 2023. Pitchers appeared to have quickly learned that throwing a high-percentage of fastballs to De La Cruz is a recipe for disaster and that they are better off throwing off-speed pitches and breaking balls to him, which is motivating his predicted pitch mix for 2024.

Conclusion

These batter pitch mix projections are valuable for forecasting the types of pitches a batter is likely to see most frequently throughout a whole season. This information allows both the batter and the coaching staff to focus their preparation on the pitch types they are more likely to encounter. With some additional contextual information, these predictions can be used on a more granular level, helping to anticipate which pitches a specific pitcher is likely to throw against a specific batter. This enables batters to prepare more effectively for individual matchups

by gaining insight into a pitcher's plan of attack against them. Overall, these projections are a useful tool for optimizing game-planning and training efficiency. However, it's important to remember that they should not be seen as definitive, and situational factors should also be considered when applying them.