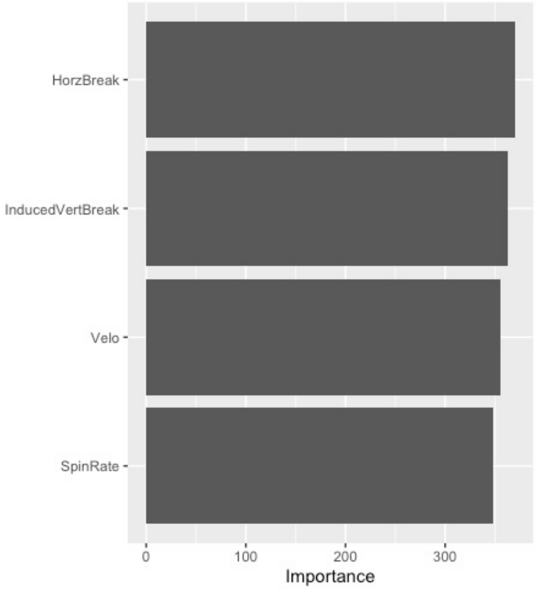
Toronto Blue Jays Baseball Research Analyst Assignment – Harrison Rubin

1. See the attached CSV file for my predictions.
2. I decided to use a random forest model to predict the probability of each pitch being put in play. I believe that a tree-based model, such as a random forest model, is optimal for this exercise because they tend to generate more accurate predictions for a dataset of this size. To construct this model, I first needed to handle the missing values for SpinRate, which was done by using a linear imputation. Next, I set the mtry argument to be a range from 1 to 3 in order to avoid model overfitting. After applying the hyperparameters to the random forest model, I evaluated the model's performance, which resulted in a maximum accuracy score of 0.73. After evaluating the model itself, I deployed the model on the "deploy" set, which generated the resulting probabilities of each pitch being put into play.
3. According to this variable importance plot, each of the four predictor variables are positively important in determining the probability of each pitch being put into play. The order of importance from most important to least important is as follows: HorzBreak, InducedVertBreak, Velo, SpinRate.



4. If I were in the analyst role and had another week to work on the question posed by the pitcher, I would (1) build an ensemble model including components from random forest, neural network, MARS, SVM, and k-nearest neighbor models, and (2) explore ways to integrate other predictors into this ensemble model. From my own experience building similar models, I learned that various hit ball metrics (such as exit velocity, launch angle, and spray angle) are incredibly important in understanding the success of a pitch.