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EXTRA INNINGS BASEBALL SIMULATOR

A tremendous amount of data analysis occurs around baseball, especially Major League Baseball, but most advanced statistics focus on individual players, as baseball both has a large variety of individual statistics and the impact of a given player can be looked at much closer to isolation than many other sports. On the other hand, this means that estimates regarding the performance of a team as a whole are often formed by simply summing considering the team as a sum of individuals without considering the unique circumstances created by the particular lineup. Furthermore, most current team simulation systems are either proprietary or limited in scope. As such, we propose the creation of an advanced web-based baseball simulation system to allow the average fan to more effectively analyze the wealth of baseball statistics available.

Major Components

This project would consist of three major components: data management, simulation engine (backend), and webapp (frontend). Data management would entail collecting both historical and projected statistics as requested and storing them effectively for convenient manipulation. The simulation engine would at its core simulate baseball games based on the statistics of the hitters, pitchers, and fielders involved; adding more features and capability to the simulation system would in theory make the resulting statistics more accurate, but a basic simulation would still produce some useful information, so the simulation quality could be increased over time. Finally, the webapp would allow users to tweak lineups, rosters, and simulation settings as they see fit and then simulate a large number of games to examine the resulting individual and team statistics.
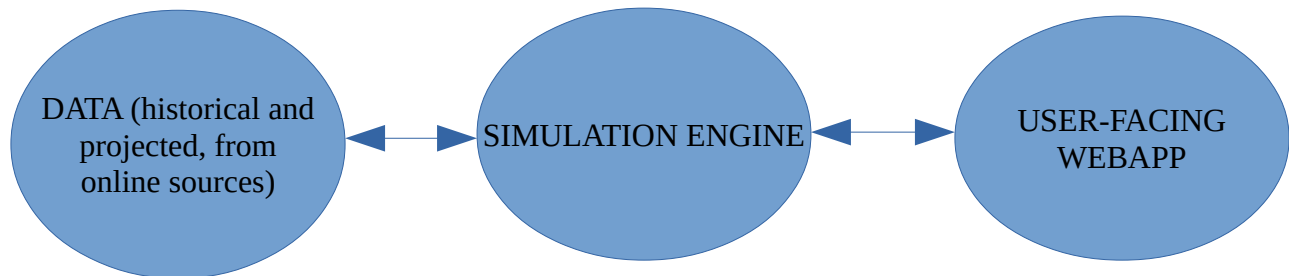
Potential Features

Basic Features:
- Tweak a team's lineup or roster, examine results over a large number of simulated games
- Determine a 'win range' for the same roster over many simulated seasons
  - Have certain teams been lucky or unlucky in past seasons given their roster?
  - Estimate playoff chances for a team by simulating the entire league over many seasons
- Customizable settings for how much influence the pitcher and hitter have over an atbat

Advanced Features:
- Park and era adjustments
  - Compare historical teams to modern-day teams
  - More accurate application of past statistics
- Statistical splits (handedness, home/away)
- Fielding adjustments
- Customizable managerial tendencies
  - Bullpen management
  - Bunts, steals, intentional walks
- Pitcher fatigue
- Win probability calculator from a given game state
  - This could be applied to live games
  - Could explore several possible scenarios (pinch-hitter? bring in the closer?)

The most obvious risk for this project is feature creep; there are many useful features that could be added. However, most of these features are independent, so upgrades should be possible without too much clutter with proper management.