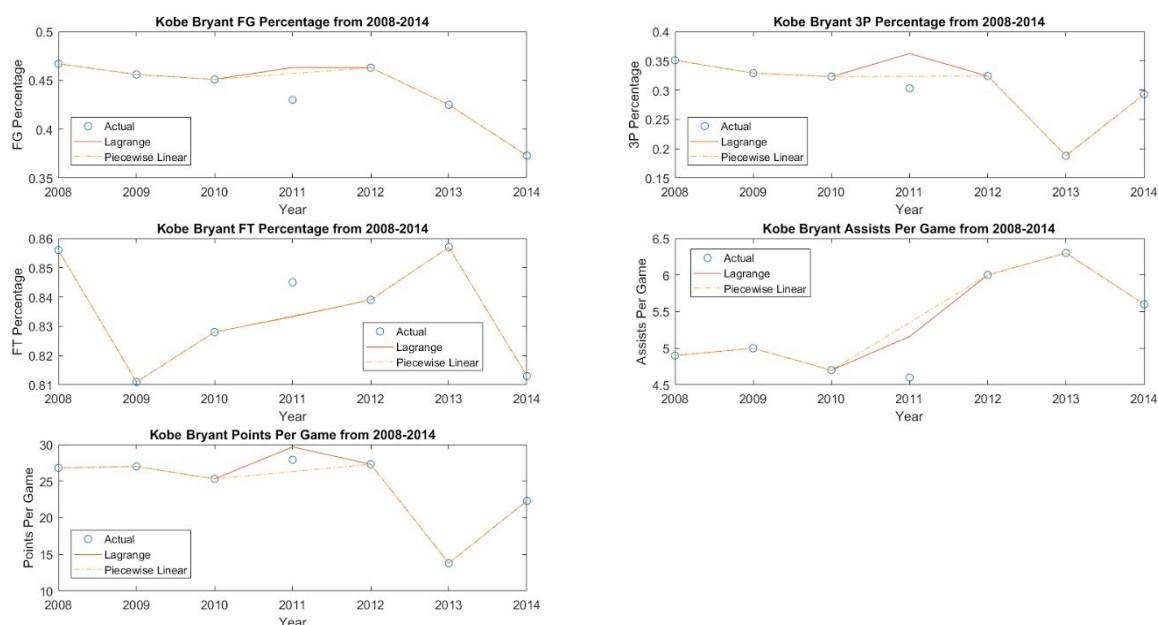


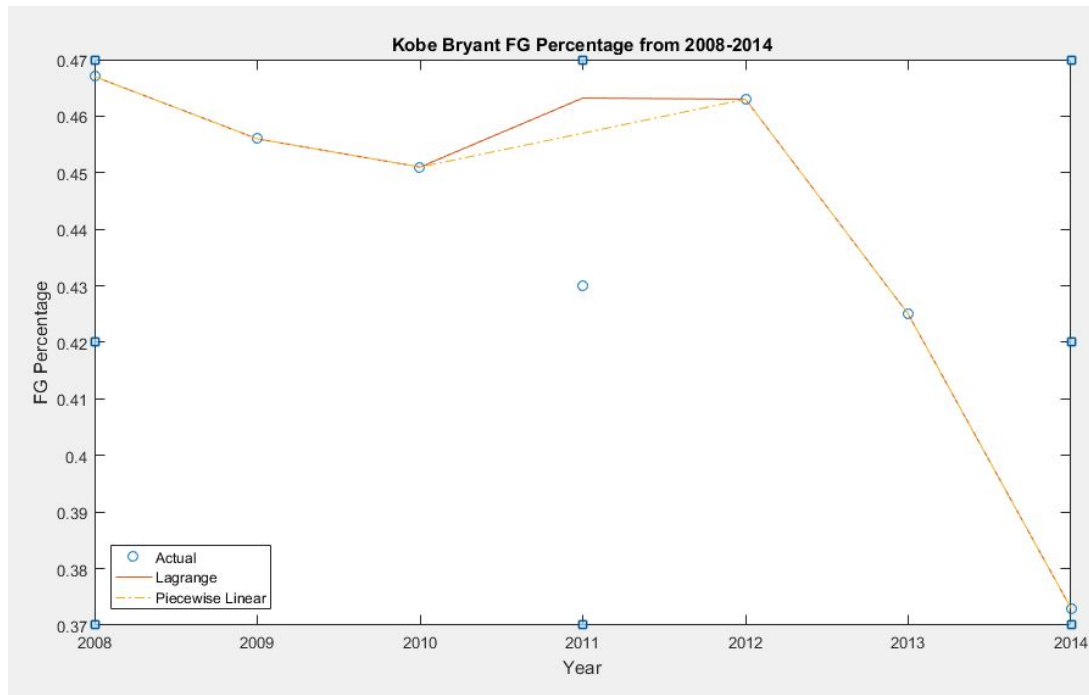
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For our project, we decided to look at NBA players' shooting and assist averages for the 2011-12 season. This season was shorter than a regular season because of a lockout caused by negotiations between the players union and the owners. This caused the season to start 2 months late and stopped players from being able to practice in team facilities and participate in preseason games. The season was 66 games instead of the usual 82 games. Due to this, we looked at whether or not players shot worse than usual because they didn't have as much practice time before the season or as many shots to take during the season.

We used two different interpolation methods to try to see what a usual season would look like, and then compared this to how the players actually performed in the 2011-12 season. The methods used were Piecewise Linear Interpolation and Lagrange Interpolation. We took data from the website: Basketball Reference (<https://www.basketball-reference.com/>) from 3 seasons before and after the 2011 season to create these interpolations and then graphed the actual results against the interpolated results. The data points considered were a player's field goal, free throw and three point percentages as well as points and assists per game. All of these correlate with how well a player is shooting in the season with the exception of assists. We included assists as we believed that if most players are shooting poorly, the number of assists per game will go down as less points will be scored. Figure 1 below displays the created graphs for Kobe Bryant. Figure 2 displays just his shooting percentage. Additional figures can be found in the project folder in the folder called "Output\_Pictures".



**Figure 1: Kobe Bryant Stats from 2008-2014**



**Figure 2: Kobe Bryant FG Percentage from 2008-2014**

When comparing the two different interpolation methods, there are a couple ways we can differentiate between the two. The computational complexity of each method as we implemented them is  $O(n^2)$ . Looking at the created graphs, the Piecewise Linear Interpolation method was more accurate than the Lagrange method. This makes sense as a player's skill level generally increases or decreases linearly. They improve their shooting until the peak of their career, at which point it begins to decline. Obviously, there will be some anomalies to this, but in general this is what we believed. The corresponding data seems to support this belief, as the ten players we considered all seem to have stats that follow this Piecewise Linear progression. Thus, with the actual stats in the 2011 season varying so greatly from this progression, we can reasonably conclude that the lockout truly affected players' averages for that season. Looking at the league-wide season statistics, we saw that the average shooting percentage did in fact decline this season. After consideration of both the Piecewise Linear Interpolation and the Lagrange Interpolation, we found that the Piecewise Linear Interpolation was more accurate and easier to implement. Therefore, we recommend this method when analyzing similar data.

## References

Basketball Reference - <https://www.basketball-reference.com/>