Pythagorean Method to Estimate Standing Points

I mention this method in several articles and thought it would be useful to have a short description of it in an article of its own, rather than buried in *The (Hamburglar) Run*.

The rest of the article is extracted from *The (Hamburglar) Run*, almost word for word.

I was first introduced to the Pythagorean Method by the writings of Bill James. Mr. James wrote yearly reviews of Major League Baseball (The Bill James Baseball Abstract) with a heavy statistical slant, but he used statistics differently than the sports writers of the day (late 1970s through late 1980s). Not that today's sports writers use statistics any differently.

Bill James would use statistics to investigate issues, rather than look for statistics to support his point of view. Many sports writers use statistics they way a drunken man uses a light pole: for support, rather than for illumination. James would shine the light on issues.

Quoting from the 1983 edition of The Bill James Baseball Abstract:

"**The Pythagorean Method predicts that the ratio between a team's wins and losses will be the same as the ratio between the square of their runs and the square of their opponents' runs.**

$$\frac{Wins}{Losses} = \frac{(Runs\ Scored)^2}{(Opposition\ Runs\ Scored)^2}$$

$$Win\ Percentage = \frac{(Runs)^2}{(Runs)^2 + (Opposition\ Runs)^2}$$

If a team scores 800 runs and allows 700, their win percentage will be about .566, so they should win about 92 games.

The method has a standard error of about 4.2 wins; we could reduce this slightly be raising runs to a power slightly below 2 (1.82 seems the most accurate), but the gain in accuracy is frankly not worth worrying about."

A slightly different formula must be used for hockey, as teams that lose in overtime get a bonus standing point while baseball teams that lose in extra innings get the same loss they would have had if they had lost in nine innings. The best adjustment comes from increasing the points percentage by 11% (1.11 in the formula below).

$$Points\ Percentage = 1.11 * \frac{GF^2}{GF^2 + GA^2}$$

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In 2021/2022, the Boston Bruins scored 172 goals and gave up 144. Plug those numbers into the formula and you get:

$$Points\ Percentage = 1.11 * \frac{174^2}{174^2 + 144^2} = 1.11 * \frac{29584}{50320} = 0.653$$

In 82 games, a Points Percentage of 0.653 would be equivalent to 103 points. By no coincidence at all (I chose Boston for a reason), Boston had 103 points.

Since 2007/2008, in 82-game seasons, this formula predicts a team's final standing points within 4 points 68% of the time.

In the last two seasons, the formula hasn't been as accurate as it was over the previous thirteen seasons. Between 2007/2008 and 2019/2020, the formula was accurate to within four points for 19 to 26 teams a year with one exception (2010/2011, 13 teams). In the last two seasons it was accurate to within four points for 16 teams, then 13 teams. I understand this to be a normal statistical variation. If your score for a round of golf is normally between 85 and 93, you will have scores below 85 (the days you golf "as you should all the time") and scores above 93 ("the windy days", "the bad chipping days", "the couldn't find the fairway with a map days").

Summary

There is no formula that would predict standing points that is 100% accurate, unless it's the one that uses wins, losses and overtime/shootout losses. 68% accuracy within four points is actually a pretty good result.

The formula can be used to (further) identify surprising teams. The 2014 Anaheim Ducks scored 236 goals and gave up 226 goals. The formula predicts that team would have 95 points, they actually had 109 points. They got lucky, and rode their luck to the Western Conference finals, losing to eventual champions Chicago in seven games.

The 2011 Boston Bruins outscored their opponents 269-202. They should have had 116 points, but they "only" had 102 points. They were unlucky, and continued to be unlucky in the playoffs, losing to the seven-seed Washington Capitals in the first round.

The surprisingly bad 2016 Colorado Avalanche finished 22-56-2 for 48 points. Pythagoras was not surprised. They were outscored 166-278: the points prediction formula says that should be good for 48 points. The surprising part was their being outscored, not the result of their being outscored.