An Analytical Approach for Fantasy Football

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In this paper, we consider the online game Fantasy Football, which has become increasingly popular. It is estimated by Fantasy Sports Trade Association that in 2010 there are 32 million people in the US and Canada play fantasy sports online\(^1\). About 85 percent of all fantasy sports participants play fantasy football, most of whom have their games set up in major media websites such as Yahoo!, ESPN, MSN, and NFL\(^2\). Numerous websites have specialized in reporting NFL games, providing preseason ranking, fantasy points projection, team/player statistics, and expert draft opinions. However, despite the vast popularity of the game, the intensive analysis by experts, and various online tools that offer predication for the values of players, to the best of our knowledge, there is no method that provides a comprehensive strategy for the entire Fantasy Football season, thus to win a season is, by and large, still more of an art than a science.

We set out to develop such a methodology that predicts team/player performance based on the rich historical data, and builds a mixed integer optimization model using such predications for the draft selection as well as weekly line-up management that incorporates the entire objective of winning a Fantasy Football season. In particular, to predict team/player performance, we assume each team/player has an innate talent for achieving each relevant fantasy statistics. The projection for the level of each statistic achieved by a team/player in a given week is the product of their innate ability and their opponent’s ability to counteract. The mixed integer optimization model has an objective of maximizing the number of head-to-head match-ups won during the Weekly Play and Playoff phase, as well as the total number of Fantasy points scored throughout the season. The constraints capture the dynamics of the draft selection process, and builds in a robust anticipation of the opponents’ drafting behavior and in season team management. The resulting MIP formulation has about 700 integer variables, 11,000 continuous variables, and 11,000 linear constraints. Due to its special structure, this MIP can be solved quickly, which is crucial for the very limited time frame (1-3 min) allotted for each draft picks.

For the purpose of predicating player performance, we obtained data corresponding to the performance of individual players and NFL teams for the 2004-2008 NFL seasons. We also obtained preseason Fantasy draft rankings for each position from expert articles. Furthermore, we obtained summary reports of expert mock draft behavior for the 2007 and 2008 preseasons.

We train our model using the data of 2004-2006 seasons and simulate drafts comparing our strategy to the use of expert ranking lists and mock draft behavior for the 2007 and 2008 seasons. The results are encouraging and shows an edge of our method over the conventional strategy. We further extend our methodology to ‘Salary Cap’ versions of Fantasy Football where individuals compete in large public leagues selecting players subject to an overall resource constraint. In 2010, a bot running this approach placed 28th out of over 50,000 entries in a public Facebook league.

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\(^1\)http://en.wikipedia.org/wiki/Fantasy_sport/