

The importance of a match in a tournament

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Abstract

A quantitative measure of “match importance” is useful in a number of decision problems, for example: as a metric in tournament design; for selecting matches for broadcasting; for scheduling matches in a tournament; and for assigning referees. To date measures of match importance used in such analyses have been relatively naïve. We discuss a general measure that considers the effect of a particular match on the end of tournament position, given the results of all other matches, some played, some predicted. We use logistic regression to predict matches and Monte Carlo simulation to compute the match importance measure, and apply these to soccer matches in the English Football Association Premier League.

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1. Introduction

In sport, taking part is important, but success matters—competitors play to win, spectators want to watch winners. Therefore, in a sports tournament in which teams or competitors play ties or individual matches, the progression or elimination of teams or individual competitors is fundamental for maintaining the interest of participants and spectators. Szymanski [1] has also argued that competitors, particularly in American team sports, are profit maximisers and hence play for profit. The financial incentive for winning is high. The incentive for surviving will also be significant, since relegation from a leading league division, for example, will have serious consequences for future income from broadcasting contracts, in particular. Thus, matches in which the championship is at stake may have financial implications that are comparable to matches in which survival (in a particular league division) is at stake. Competitors are expected to raise their game in matches that are critical, and economists (e.g. [2–4]) postulate that consumer demand for sport is higher when the “championship” or promotion or elimination (relegation) is at stake. However, in round-robins, or the group-stages of a tournament, the outcome of particular matches may have no influence on progression or elimination and hence the outcome of the tournament. Such unimportant matches are reduced to the status of irrelevant “friendlies” and may form a significant proportion of the matches in a tournament. If we accept the notion that unimportant matches should be avoided, then the following question arises: how should we define or measure the importance of a match in a sports tournament? Furthermore, how might this measure of match importance be used in decision-making about, for example: the modification of tournament design; fixture and broadcast scheduling, and referee assignment?

This paper provides answers to these questions. In particular, in the following section we give a definition of match importance. Then, in Section 3, the uses of such an importance measure are considered. For the definition given in

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Section 2, a probabilistic model of match results is required for the computation of match importance—such models are described in Section 4. The computation of match importance itself is discussed in Section 5. The ideas of the paper are then applied in the context of the English Football Association Premier League (FAPL) in order to demonstrate how match importance can be calculated. We conclude with a discussion of remaining issues and the potential for further development.

2. Definition of match importance

Consider a round-robin in which n teams play each other in paired matches. The winner of the tournament (the “champion”) is the team with the largest number of wins in individual matches after all matches have been played; this may be extended to include draws, with league-points awarded for wins and draws. Further refinement separates teams level on league-points by some other measure such as within-match scores (e.g. goal difference in soccer). In such a tournament and at a particular point in its play, a significant number of matches between teams with few wins thus far will have no influence on the outcome of the tournament and these matches may be considered to be unimportant. In certain tournaments, round-robins may be played in the first round to determine qualifiers for a subsequent second round. Again, a number of later matches in the round-robin may have no effect on determining the qualifiers. First round, round-robin designs to determine second round qualifiers are used in soccer in the FIFA World Cup and the UEFA Champions League tournaments, for example. This format contrasts with a knockout, or single elimination tournament in which 2^n competitors play n elimination rounds to determine a winner, such as used in “grand slam” tennis tournaments. All matches have an effect on determining the winner and are therefore important. This leads to the following working definition: a match is unimportant if it can have no influence on the tournament outcome, and match (un-)importance is a dichotomous measure here. For example, for a round-robin such as the UEFA Champions League first round group-stage (comprising four teams in each group playing a home and away round-robin with two to qualify), approximately 8% of matches are un-important [5]. One might argue that only matches involving the eventual winner are important, but in reality one considers the importance of a match at the time of or before it is played. This then leads to the idea that one wishes to measure the importance of a match at some time t prior to its being played.

The dichotomous measure of match importance defined above is not completely satisfactory, however, since some matches may only be important “on paper”. That is, matches may be very unlikely to influence the outcome of the tournament since they may be between teams that are weak relative to those teams that are favourites to win a tournament. A significant number of matches may fall into this category. This leads to the following definition: a match is unimportant if it is *expected* to have no influence on the tournament outcome. In this definition, we introduce the idea that the results of matches are uncertain, and so a probabilistic measure of match importance is desirable. Thus this definition supposes that *expectation* is considered with respect to the joint probability distribution of the outcomes of the matches in the tournament.

Returning to the question of time frame, one would expect a measure of importance for a particular match to change over time. For example, at the start of a season of matches in a league division tournament, say, one might consider a match scheduled for mid-season—some months away—to be important. However, by the time the match is played, the match may be unimportant as a result of the competitors being too far behind the leaders (in the league or group-stage). Thus we refine our definition further still: a match played at time $t + k$ is unimportant at time t if it is expected, at time t , to have no influence on the tournament outcome. Thus, expectation here is with respect to the joint probability distribution of the outcomes of remaining matches, excepting the match of interest, given the results of matches played up to time t .

Interest in a round-robin competition is maintained not just through uncertainty about the winner, but also through other objectives for competitors such as qualification for some higher competition or league. For example, in the FAPL 20 teams play a home and away round-robin with 380 matches in all over a nine-month season. Apart from contesting the championship to determine the winner of the league, the top four teams qualify for the UEFA Champions League (a competition for the best European teams). The fifth and sixth placed teams qualify for a minor European knockout tournament (UEFA Cup), and the bottom three teams are relegated to a lower division. The financial implications of these latter outcomes can be more significant than winning the championship. In this way, matches will be important (or otherwise) not just for the championship, but for *qualification* and *relegation*. Thus in general, we will need to consider the importance of a match with respect to an outcome X . Furthermore, a match may be important to one competitor but not another; at time t , competitor or team 1 may still be in contention for the championship, competitor 2 may not, and

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