Moneyball and the Role of Sports Analytics: A Decision-Theoretic Perspective

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Sports analytics is the use of data analysis to support decision making by managers, coaches and support staff in the sporting operations of teams. The possibilities of gaining a competitive advantage from the use of sports analytics have been highlighted in the bestselling book, Moneyball (Lewis, 2003), which tells the story of how the Oakland A’s in the MLB utilised the insights of sabermetrics to identify undervalued players and exploit informational inefficiencies in the MLB players’ labour market (Hakes & Sauer, 2006). The subsequent Hollywood movie portrays the A’s as a very dysfunctional organisation with continual conflict between the two modes of decision making, analytics as championed by the GM, Billy Beane, and the intuitive and experience of the scouts and field coach. The purpose of this research is to re-visit Moneyball and its implications for the role of sports analytics by drawing on the decision-theoretic literature on the relative merits of expert judgment and statistical analysis.

Literature Review

The starting point for modern research on expert judgement and statistical analysis is Meehl’s 1954 comparison of 20 studies in a wide range of areas which showed that statistical analysis always provided at least as good predictions of future outcomes, and in most cases, significantly more accurate predictions than experts using their intuition and experience. Dawes (1988) and Kahneman (2012) both reach the same conclusion. Dawes states that ‘the finding that linear combination is superior to global judgment is strong; it has been replicated in diverse contexts, and no exception has been discovered.’ (1988, p. 207) A common finding is that unstructured interviews tend to lead to poorer decisions since metrics of past performance tend to be marginalised in favour of information that has become the specific focal point of the interview but with limited predictive content. However although the decision-theoretic literature concludes very clearly that statistical analysis provides better support for decision making, it does not necessarily follow that expert judgment has no value. Dawes argues that experts have a critical role in ensuring that a comprehensive set of appropriate predictors are used in the statistical analysis. Dawes (1979) also questions the superiority of statistical models, showing that proper linear models (i.e. statistical models derived using multiple regression) have little or no predictive advantage over improper linear models using equal or random weights to combine predictors. For Dawes the key feature of a model-based approach is the consistent treatment of predictors across all decision alternatives not the specific weighting system used.

A Decision-Theoretic Perspective on Sports Analytics

From the decision-theoretic perspective Moneyball is a case study of the relative merits of using a systematic approach to evaluating alternative players using performance metrics rather than a non-systematic approach based on the subjective evaluations of scouts. A secondary aspect is the sabermetric issue of identifying the most predictive metrics (i.e. on-base percentage vs batting or slugging averages). But Moneyball represents a special case in which players are essentially being evaluated with regards to a single skill. The more general case, to be found in the invasion-territorial sports such as the various codes of football, hockey and basketball, is evaluating players on multiple skill dimensions. There are two distinct problems, an identification problem of determining the most appropriate set of skill-specific performance metrics, and a composition (or weighting) problem of how best to combine the set of skill-specific performance metrics to construct a summary player performance rating. The decision-theoretic literature suggests that experts (i.e. coaches and scouts) are skilled in resolving the identification problem but algorithms provide a more effective solution to the composition problem. And, following Dawes’ findings on improper linear models, once units of measurement are standardised across different metrics (e.g. using Z scores), there may be little gain from applying multiple regression rather a simpler, non-sample-specific set of equal weights to combine the skill-specific performance metrics.

An Empirical Application
The differences between proper and improper linear models for rating players is investigated using data for 288 rugby league players with at least 25% game time during the 2013 Super League regular season in England. Eight performance metrics are available – games played, minutes played, carries, metres gained, tries scored, clean breaks, tackles made and missed tackles. All of these performance metrics are expressed as cumulative totals. Players are ranked using a variety of algorithms including proper linear models with weightings derived from multiple regression analysis of team performance and improper linear models with equal weights applied to Z-scores. As expected, it is found that there is a relatively high correlation between the player rankings generated by proper and improper linear models but the rankings are very sensitive to how game time is treated.

Conclusions

The potential role of sports analytics may have been somewhat exaggerated from the decision-theoretic perspective which strongly supports (i) the importance of expert judgment of managers, coaches and scouts in identifying the key performance metrics; and (ii) the limited gain in predictive accuracy from sophisticated statistical modelling compared to simpler, equal-weights algorithms. Rather that championing the efficacy of analytics, decision-theoretic research suggests that effective decision making combines both expert judgment and statistical analysis.

References


