Maximising Stadium Attendance: A Case Study of Malaysian Football

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Abstract: Malaysian football is seeing a decrease in the number of supporters at stadiums. We propose that a level of importance is defined for each fixture, which we then maximise. This is in the expectation that the more important a match, the more attractive it will be for supporters.

Introduction

Football in Malaysia started in the 1900's, after being introduced by the British. It has developed ever since and the administration of Malaysian football is now the responsibility of the Football Association of Malaysia (FAM).

There are four main national football competitions in Malaysia; the most prestigious being the Malaysia Super League (MSL), the others being the Premier League, the Malaysia Cup and the FA Cup.

The MSL was introduced in 2004, replacing the M-League. It is a privatised league with a private company, MSL Sendirian Berhad (MSLSB), overseeing the promotion and marketing of the MSL. The league began with 8 teams (Kedah, Pahang, Perak, Perlis, Pulau Pinang, Sabah, Sarawak, and Selangor PB). It has a relegation system whereby the bottom two teams are replaced by the top two teams from the Premier league. In June 2006, FAM increased the number of teams in the MSL to 14, in order to encourage more competition.

The MSL has completed four seasons: season 2004 (14 February, 2004; 7 July, 2004), season 2005 (29 January, 2005; 9 July, 2005), season 2005-2006 (3 December, 2005; 23 May, 2006), and season 2006-2007 (16 December, 2006; 4 August, 2007). Since its inception, no team has won the championship more than once. In season 2004, Pahang were the champions; in season 2005, Perlis; in season 2005-2006, Negeri Sembilan, and last season, 2006-2007, Kedah finished top of the league.

Although the MSL is a professional league, the number of stadium supporters is decreasing. The purpose of this study is to investigate how to maximise gate receipts, by investigating ways in which we could increase the number of supporters who attend football matches in Malaysia. We propose to define a *level of importance*, *L*, for each fixture and then maximise over *L* for the whole season, by scheduling the fixtures in order to do this. This is based on the assumption that the more important a match, the higher the interest will be.

Related Work

Studies that have focused on attendance for leagues such as soccer, baseball, US football, Rugby, Australian football, hockey, basketball and cricket are reported in (Borland and Macdonald 2003). Scarf and Shi's recent paper reported the importance of a match in a tournament with the match importance being determined using Monte Carlo simulation (Scarf and Shi 2008). Other studies using mathematical techniques include studies by Boginski et al. (2004) where they used two matrix-based decision making models for ranking college football teams; Colley Matrix and Analytical Process method. Dobson and Goddard's (2004) study considered the modeling and forecasting of match results in the English leagues. Factors influencing match results included the importance of a match for winning the championship, promotion and relegation.

Of course, there are many other scheduling problems associated with football. For example, some early work by Schreuder (1992) considered scheduling matches in the Dutch football league. More recently, (Kendall, 2008) considered the minimisation of travel distances over holiday periods.

Analysis of Football Association of Malaysia

The number of spectators attending football matches in Malaysia is decreasing, which was reported to us by an FAM representative during a recent visit to Malaysia in order to collect data for this project (Jaafar, 2007). This decrease is partly due to the fact that spectators prefer to watch football at home. Figure I shows the number of TV viewers, which increased by 3.4%; from 16,692,000 in 2005 to 17,258,000 in 2006.

Figure I Total TV viewers

League	2005	2006
Super League	4,613,000	4,513,000
Premier League	3,008,000	3,879,000
Malaysia Cup	3,789,000	3,412,000
FA Cup	5,282,000	5,454,000
Total	**16,692,000**	**17,258,000**

With the decrease of spectators at the stadium, and spectators preferring to watch games on TV, we propose an optimisation solution in order to maximise attendance, by scheduling fixtures in order to make them more attractive which, we hope, will attract more spectators to the live games.

Proposed Methodology

We propose to define a *level of importance* for each fixture and then attempt to maximise over that value. We hypothesise that spectators would prefer to watch matches at the stadium if they are more important.

Data has been collected from FAM, including previous fixtures and results. We have also collected ticket sales information from MSLSB. In season 2004, 2005 and 2005-2006, only eight teams were competing in the MSL. The total number of fixtures played was 84, as there were three rounds. In 2006, the FAM decided to increase the number of teams in the MSL to 14. They now play a double round robin tournament, giving 156 fixtures to be scheduled. In fact the 2006-2007 season started with 13 teams as, during the registration process, one team dropped out. Due to the change in the league structure, it is not sensible to compare the 2006-2007 season with previous seasons. For the purpose of this study, data from the 2006-2007 season will be used as a benchmark and will be compared against the current season (2007-2008), once it is completed.

Our current work is focusing on being able to generate the league table for any point in the season, using the results to date. We require this information as we believe that one of the factors that make a fixture *important* is when two teams, either at the top of the league or at the bottom, are playing each other. As an example, in a match between Kedah and Perlis on 21 February, 2007, at the Darul Aman Stadium, 25,000 spectators turned up. Referring to the chart (figure II), Perlis were top of the league, while Kedah were third (figure III).

Figure II Chart showing Perlis' performance in terms of spectators and league position.
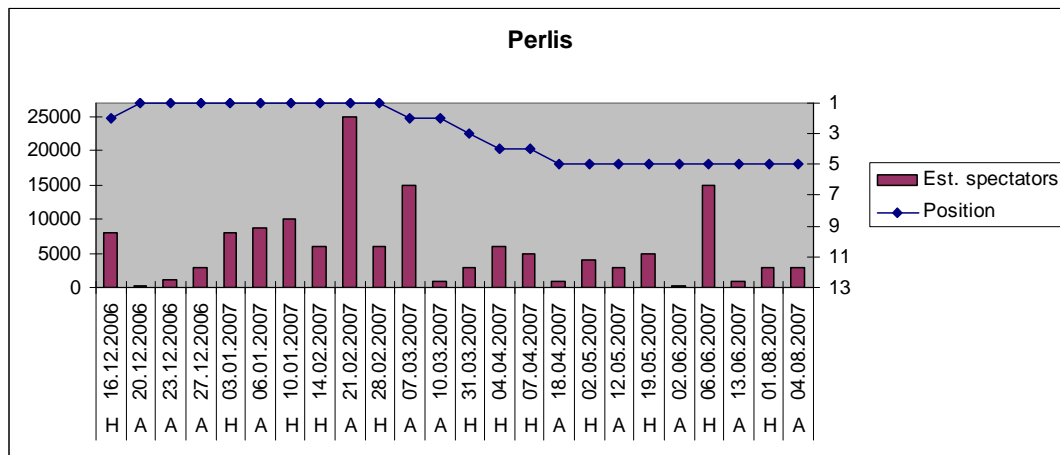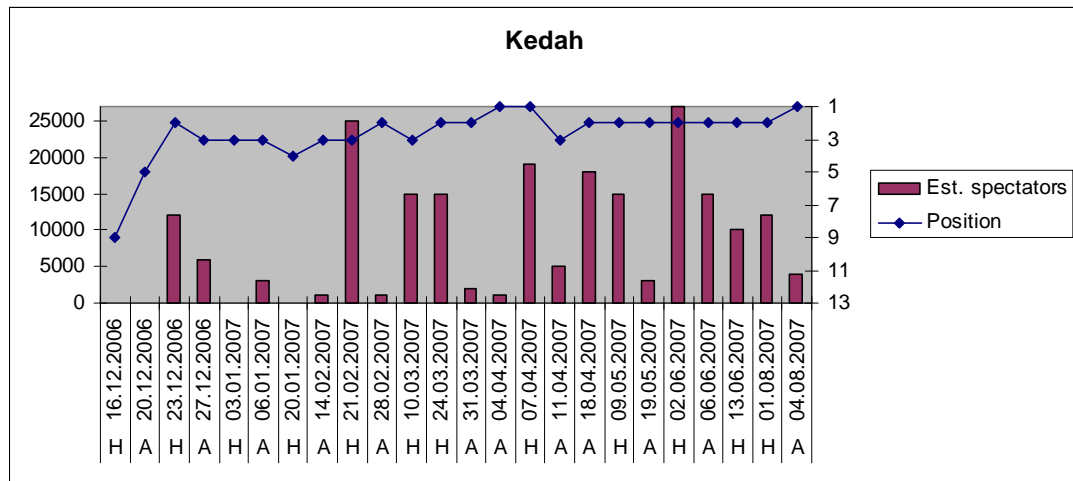
Figure III Chart showing Kedah's performance in terms of spectators and league position.

* 16/12/06, 20/12/06, 03/01/07 – missing data

We are currently carrying out further investigation to ascertain what makes a match important. We will then define an *importance* function which we will optimise using techniques such as tabu search, simulated annealing, genetic algorithms and hyper-heuristics. At the conference we hope to define more formally our *importance* function and, perhaps, report some preliminary results.

References

Boginski V., Butenko S. and Pardalos P. (2004) *Matrix-based methods for college football rankings*. In: Butenko et al. (eds) Economics, Management and Optimization in Sports, Springer-Verlag, Berlin.

Borland J. and Macdonald R. (2003) *Demand for sport*. Oxford Review of Economic Policy 19(4): pp 478-502.

Dobson S. and Goddard J. (2004) *Modelling and forecasting match results in the English Premier League and Football League*. In: Butenko et al (eds) Economics, Management and Optimization in Sports, Springer-Verlag, Berlin.

Jaafar Z. Personal Correspondence, 29th Nov, 2007.

Kendall G. (2008) *Scheduling English Football Fixtures Over Holiday Periods*. Journal of the Operational Research Society, 59(6), pp 743-755

Scarf P. and Shi X. (2008). *The importance of a match in a tournament*. Computers and Operations Research, Vol. 35(7), pp 2406-2418.

Schreuder J.A.M. (1992). *Combinatorial aspects of construction of competition Dutch professional football leagues*. Discrete Applied Mathematics, 35, pp 301–312