FOOTBALL GAMBLING MARKET [4]

- A football market is described as being inefficient if there are one or more betting strategies that generate profit, at a consistent rate, as a consequence of exploiting market flaws
- accuracy between bookmakers is extremely consistent
- profit margins have been dramatically reduced over the last decade
- there are regular predetermined biases in published odds
- there are arbitrage opportunities
- profit margins can be significant even when considering one bookmaker and one football division
- published odds of one bookmaker cannot be considered as representative of the overall market
- systematic adjustments of published odds cannot be explained by rational qualitative factors
- conflicting adjustments of published odds occur between bookmakers
- this inefficiency is considered as the outcome of commercial objectives rather than lack of ability to beat
- the gambling market appears to allow exposure and losses against the very best of bettors and
- in return increases profits against the residual, more casual bettors

PI-FOOTBALL [2, 3] $a_{\text{pi}}$ena

- Bayesian network model for forecasting Association Football matches
- subjective variables represent the factors that are important for prediction but which historical data fails to capture
- generates forecasts about the outcomes of the English Premier League matches
- forecasts are published online at www.pi-football.com prior to the start of each match
- for season 2010/11 and at standard discrepancy levels of 25% the profitability ranges from 2.87% to 8.67%, depending on various bookmakers’ odds
- at higher discrepancy levels (8% to 11%) the maximum profit observed ranges from 8.40% to 35.63%
- no other published work appears to be particularly successful at beating all of the various bookmakers’ odds over a long period of time
- the model continues to be profitable at similar rates for current season 2011/12

PI-RATING [5]

- provides relative measures of superiority between adversaries
- measured dynamically
- based on the relative discrepancies in scores between adversaries
- ratings are meaningful in terms of expected score difference
- applicable to any other sport (assuming scores)
- outperforms the standard bivariate Poisson distribution method that has been previously proposed and extensively used throughout the football academic literature
- resulting ratings can be used as one of the model parameters for prediction purposes
- allows extension of this research to answer questions such as: a) which football league is best, the English Premier League or the Spanish La Liga?; b) to what degree lower divisions differ from higher divisions in England; c) how much damage has the 2006 Italian football scandal caused to Serie A?

ACCURACY ASSESSMENT [1]

- a scoring rule is a method that is used to assess the accuracy of forecasts or the performance of repeated decisions under uncertainty
- previous studies have been using various scoring rules to assess football forecast models
- no agreed scoring rule existed for determining their forecast accuracy
- the various scoring rules used for validation were inadequate since they failed to recognize that football outcomes represent an ordinal scale distribution
- the Rank Probability Score (RPS) [6] represents the difference between the cumulative distributions of forecasts and observations and overcomes this problem

Table 1. Hypothetical forecasts

<table>
<thead>
<tr>
<th>Match</th>
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<tr>
<td>4</td>
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</tbody>
</table>

Table 2. Applying the scoring rules to each benchmark scenario

<table>
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<tr>
<th>Benchmark</th>
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<th>Score 2</th>
<th>Score 3</th>
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<tbody>
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<tr>
<td>Score 3</td>
<td>g</td>
<td>h</td>
<td>i</td>
</tr>
</tbody>
</table>

Table 3. RPS scores for each hypothetical forecast

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REFERENCES