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Beat the Tipster:
usage of intelligent agents to predict sports events

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Abstract

The project reviews the problem of predicting sports events and compares the forecasting accuracy of different approaches such as statistical models, Bayesian networks and machine learning techniques, bookmakers and betting exchanges odds and combinations of these to assess the potential systematic profitability. A data set of 411 football games, played in the current 2013/2014 season, is used in this case study. Weight-based and rule-based approaches are tested to identify the most profitable techniques. The empirical results of the tests are then compared to the methods and success rates, described in previous studies. The final version of the predictor has a slight advantage in success rate compared to the betting exchanges and bookmakers market odds so it is possible to gain profits if the rules are strictly followed.

A web design and a game design for a sports predictions online platform are created on the basis of the research results and they are presented and evaluated in the report.

Keywords: Sports forecasting; Betting markets; Prediction game

Word count: 9782

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Acknowledgments and Statement of Originality

The work presented in this report is all original work, except where otherwise indicated. The CSS and Javascript libraries used for the front-end design of the web platform are external and referenced where appropriate.

I would like to thank Alex Rogers for his time and assistance in shaping this third year project. Some of the research ideas in this report are partially inspired by the previous work on the topic undertaken by Matthew Tucker in 2012.

Chapter I

1 Introduction

1.1 Project Description

Predicting the correct outcome of a sports game is a very challenging task due to the extensive number of factors and variables that can change the course of events on the court or on the field. The large amounts of available data allow researchers to undertake significant work obtaining while testing different hypotheses in attempts to classify and compare the forecasting methods.

The factors on which the outcome of a future sports event depends can be classified as objective and subjective. The former ones are the statistical data units that can be quantified such as the historical results of the involved players or teams. The subjective factors are usually more difficult to classify and might include player availability, morale, fatigue and motivation of the teams.

This project reviews the sports prediction problem and compares the forecasting accuracy of different approaches such as statistical models, Bayesian networks and machine learning techniques, bookmakers and betting exchanges odds and combinations of these to assess the potential systematic profitability. A data set of 411 football games, played in the current 2013/2014 season, is used in this case study.

A design for an online sports prediction game is described in the report. The scoring rules of this game correlate to the profitability of the predictions in a betting market and thus they are used in the report for a comparison between some of the forecasting methods and the final version of the “Beat the Tipster” predictor. The potential features of the web platform are described in the report and compared to existing sports prediction markets.

1.2 Project Goals

The “Beat the Tipster” project aims to review the available sports forecasting methods that can be used not only in to predict the winner of an event but also to perform well in the “Correct Score” betting markets. Comparison on the potential profitability and success prediction rates, according to previous studies in this field, is conducted to obtain a starting point and target results. Based on this research, new ideas for prediction algorithms are designed, implemented and tested. The aim is to exceed the forecasting accuracy of the public and expert opinion that is represented by the bookmakers’ odds and the tipsters’ predictions respectively. This would allow for a steady rate of profitability over a large enough set of bets.

1.3 Report Outline

The remainder of this report is structured as follows: Chapter 2 describes the commonly used and investigated sports forecasting methods and the results of previous studies; Chapter 3 reviews the predictor game competitors and the features of “Beat the Tipster”; the results of the conducted research into forecasting accuracy of experts, bookmakers odds and the ESBO algorithm, which is built during this project, are thoroughly reviewed and compared in Chapter 4; and the project management, critical evaluation and conclusions in Chapters 5-7 completes the report’s main body.

Chapter II

2 Background and Literature Review

2.1 Sports Forecasting Methods

Nowadays the successful forecasting is crucial for the team scouts and statisticians, the betting markets, the sponsoring companies, the media and the sports fans. The increasing number of gamblers who use betting platforms and exchanges [1] leads to a greater demand for an expert advice regarding the potential outcome of future events. This demand opens a whole business market and thus is met by a large number of online tipster websites which offer an expert advice and daily predictions for their subscribed users. Other means of predicting a sport event that will be analysed in this report are the betting odds. Fixed odds indicate the professional predictions of the bookmakers [2] whereas a betting exchange reflects on the combined expectations of all gamblers, who hold shares of the involved teams, and thereby providing an aggregated expert opinion [3].

It is also an interesting research problem as the outcome of any sports game or competition is dependent on many objective and subjective factors. Machine learning techniques and various statistical models are used to classify these factors and make use of the available data. A number of studies confirm that combining the results of different forecasting methods can improve the overall prediction success rate [4] [5]. This chapter reviews thoroughly some of these methods.

2.2 Overview of Forecasting Methods

2.2.1 Experts

Professional advice on the likely outcomes of sports, political or financial events is promptly available in many online sites and newspapers. Independent experts usually forecast market prices, future asset rates, political elections and sports matches. Expert predictions of sport outcomes are most commonly given by columnists and journalists in web and television sports media as a free advice. These experts do not derive their predictions from a consistent model but rather base their bets on intuition, experience and more formal data such as head-to-head record, latest form and availability of key players [6]. The predictions are focused on a single sports league or other limited selection which reflects their specialty.

The other type of self-proclaimed expert tipsters are the online websites who offer their predictions as a service. These companies usually promote several years of experience in the sport and a success rate of above 80% for their "guaranteed" predictions but no independent studies have confirmed these. Moreover, a lot of articles and blog posts confirm scams identified [7] such as posting all the possible outcomes of an event in a forum and setting the posts as hidden until the end of the match when only the right prediction is set to visible whereas the rest of the bets are deleted. This way the potential user is tricked to believe that the service is incredibly reliable when seeing the date and time of the correct prediction.

The factual evidence available regarding the success rates of the tipsters' predictions points out that their skills are fairly limited compared to other prediction techniques as "in nearly all cases where the data can be quantified, the predictions of the statistical models are superior to those of the experts" [8]. An in-depth analysis of three football experts, who were working for *"Daily Mail"*, *"The Mirror"* and *"The Times"* newspapers respectively, and 1694 English Premier League games shows that the experts' predictions are just slightly more successful than a random forecasting method but each of the tipsters is clearly outperformed by a consensus forecast across the three of them [9]The average success rate of the three tipsters is 42.17% which, according to Forrest & Simmons, suggests an inefficient use of the available information as their success rate can be surpassed by people with little knowledge about the English Premier League [10]. These results add to the findings of Torngren & Montgomery about the relatively poor forecasting success of the stock market experts [11].

2.2.2 Betting Exchanges

The betting exchanges are speculative markets where people can trade virtual stocks that are directly related to the outcome of future events and thus "exchange" bets. The futures are most often sports events and the payoff is received by the owners of virtual shares of the winning team or person. Consequently, the share prices in an exchange market reflect on the aggregate expectation of all traders' public and private information and thus serve as a good predictor of the actual outcome of the event [12]. Depending on the number of gamblers who hold stocks related to a given event, the betting exchanges have not only the aggregated information about that event but the prices also react urgently to any new information such as injury news, managers' press conferences and interviews, change of venue or even suspicions over event fixing [13].

The largest two commercial betting exchanges nowadays are Betfair (with over 4 million customers [14]) and BETDAQ. The exchanges offer a "fair" book that is the sum of the relative probabilities of all the potential outcomes of an event. An example probabilities in a horse race are shown below [15].

Teams	Betfair	William Hill	Ladbrokes
Ouija Board	3.10	2.50	2.62
David Junior	3.50	3.25	3.00
Aussie Rules	7.20	6.50	6.00
Notnowcato	11.5	10.0	11.0
Blue Monday	11.5	10.0	11.0
Snoqualmie Bay	23.0	21.0	17.0
Notable Guest	41.0	26.0	26.0
Hattan	100.0	67.0	67.0
Royal Alchemist	300.0	251.0	201.0
Over-Round	101.8%	116.6%	118.1%

Table 1: Betting Exchange and Bookmakers Overround

The amount by which the sum of probabilities exceeds 100% is the overround and it represents the traditional bookmaker's potential profit when the accepted bets are in the same proportions as the outcome probabilities. Therefore the betting exchanges offer around 20-25% better odds than the traditional bookmakers as the overround in a large exchange market is close to 0% compared to up to 20-25%

with the traditional bookmaker. Moreover, the clients can potentially get even higher betting odds than what is currently available on the market if they place an order for a better price. If a market is available at best odds of 5.00 (4/1 in fractional odds) but a gambler only wants to back that outcome at 7.50 (13/2) then the gambler can place a chosen stake, e.g. £20, at the premium odds and the order will either be filled by counterbets of other clients or it will be cancelled if there are no counterbets prior to the start of the event. Moreover, in comparison to the traditional bookmakers, the customers of a betting exchange are not restricted on the sizes of their bets as long as there are other gamblers who are willing to wager a corresponding amount of money. Betfair and BETDAQ charge commissions of 3-5% on the clients' net profit on an event and that is how most of the betting exchanges' revenue is made.

By purchasing undervalued (or selling overvalued) stocks the clients engage in an event being led by their best individual opinions. The buying and selling activities alter the offered odds and this process reveals the true expectations of all participants for the event's outcome [16].

2.2.3 Bookmakers Odds

Bookmakers set betting odds for the offered events according to their expectations of the potential outcome. In the same manner as in the betting exchanges these odds can fluctuate being affected by various factors such as the public opinion represented by the amount of money a bookmaker has taken on the different outcomes of an event, new information available on injuries or suspensions of the players involved, the motivation of the teams (e.g. in football odds can be set months in advance for a fixture at the end of the season and by the time this game is played one of the teams might have nothing to play for whereas the game is a must-win for the other one), etc. [11]. In most sports the fluctuations usually occur closer to the kick-off of a game as team news information gets publicly available and thus opinions on the possible outcomes are either confirmed or drastically changed.

The decimal betting odds are converted into probability percentages in the following way:

$$b^{Draw(Home/Away)} = \frac{u^{Draw(Home/Away)}}{u^{Draw} + u^{Home} + u^{Away}} = \frac{\frac{1}{q^{Draw(Home/Away)}}}{\frac{1}{q^{Draw}} + \frac{1}{q^{Home}} + \frac{1}{q^{Away}}}$$

as $b^{Draw(Home/Away)}$ is the standardized probability that is derived from the betting odds of a Draw (or Home/Away win); $u^{Draw(Home/Away)}$ is the unstandardized probability and $q^{Draw(Home/Away)}$ are the decimal betting odds for the respective outcome.

The Python code for this procedure:

```
def calculate_chance(odds1, odds2, odds3, odds4, odds5):

    odds1_chance = 1/odds1
    odds2_chance = 1/odds2
    odds3_chance = 1/odds3
    odds4_chance = 1/odds4
    odds5_chance = 1/odds5

    sum = odds1_chance + odds2_chance + odds3_chance +
odds4_chance + odds5_chance

    coefficient = 100/sum

    odds1_chance_to100 = odds1_chance * coefficient
    odds2_chance_to100 = odds2_chance * coefficient
    odds3_chance_to100 = odds3_chance * coefficient
    odds4_chance_to100 = odds4_chance * coefficient
    odds5_chance_to100 = odds5_chance * coefficient

    print

    print("Odds #1 chance: %.2f" % odds1_chance_to100)
    print("Odds #2 chance: %.2f" % odds2_chance_to100)
    print("Odds #3 chance: %.2f" % odds3_chance_to100)
    print("Odds #4 chance: %.2f" % odds4_chance_to100)
    print("Odds #5 chance: %.2f" % odds5_chance_to100)

    return odds1_chance_to100, odds2_chance_to100,
odds3_chance_to100, odds4_chance_to100, odds5_chance_to100
```

As explained in the previous section, the bookmakers are aiming to “balance the books” by having an as even as possible risk on both (or all) sides of a bet for a particular event and thus they are able to pay off the losing bets while still keeping profit. It can be concluded then that the bookmakers are not actually trying to predict the outcome of an event correctly but they rather try to reflect the public opinion. Nonetheless, several research studies confirm that the betting odds provided by the bookmakers are actually an effective tool which can be used to forecast events in different sports such as football [5] [7], American football [17] and basketball [18]. In addition, some analysis suggests that combining different forecasting methods might improve accuracy [4] and this thesis is confirmed on a data set of 837 German Bundesliga football games by combining forecasts from experts, betting exchanges and bookmakers on a basis of rules or weightings [10] [13]. However, the downside of this strategy is that it can predict a fewer number of games as the different methods have to agree on the expected outcome.

2.2.4 Statistical Models

As the name suggests, statistical models for sports prediction are built to use historical data. On one hand, these models calculate the likely outcome as a percentage. The feature sets that forms the calculation variables usually comprise of head-to-head history between the teams, comparison of the current form, number of goals in the matches between the teams, number of goals in the latest N matches that is the temporary goalscoring form, bookmaker and/or betting exchange odds [14].

On the other hand, they estimate the expected average number of goals (or points) to be scored in that particular game using the Poisson distribution which is a mathematical concept for translating mean averages into a probability for variable outcomes.

$$f(k;\lambda) = \Pr(X = k) = \frac{\lambda^k e^{-\lambda}}{k!},$$

Figure 1: Poisson distribution formula

In the case of a sports event such as a football match, the two variables that have to be calculated with this formula are the different goal outcomes (e.g. 0-6) as the random variable X and the likelihood of team A to score against team B which is:

- Team A's Goals = Team A's Attack x Team B's Defence x Average No. Goals

The "attack" ratings are calculated as the number G of home/away goals in the last k (k is a number) matches, divided by the number of played home/away games and the result is divided by the average number of away goals per game in the last k matchdays in the league. The same logic applies to the "defence" ratings when using conceded goals.

However, purely statistical models and Poisson distribution are simple predictive models which do not allow subjective factors to be incorporated and thus their forecasting abilities are limited.

2.2.5 Bayesian Networks and Machine Learning Techniques

Bayesian networks are probabilistic statistical models that represent a set of observable quantities or inferred variables and their conditional dependencies via a directed acyclic graph [19]. A generalization of these models, which can be used for solving decision making problems, is known as a decision network [19]. They are commonly used to predict a wide range of future events including market changes, weather forecasts, sports events and football games in particular [20].

The approach combines standard statistical data such as head-to-head records, latest form, scored goals and conceded goals; and subjective factors. The potential advantage of the method over the purely statistical ones is in the latter segment – the subjective factors, which can be decisive for the outcome but yet not captured by the statistical data, such as key players availability, motivation, morale, fatigue, etc. A particular example of a model that is based on such machine learning techniques is Pi-football [12]. It uses AgenaRisk, a commercial Bayesian network and simulation system for decision making and risk analysis, which is claimed to be superior due to an extremely accurate dynamic discretisation algorithm.

Other machine learning techniques that have been applied to sports predictions are decision trees, naïve and expert Bayesian learning, k-NN, random forest and fuzzy logic [20]. In a similar way, historical match results are used as a training data.

2.2.6 Real-Time and Rule-Based Reasoning

In-game time-series approaches have been used in combination with a rule-based reasoning and Bayesian interference for more realistic predictions. The rule-based reasoner determines the strategies of the teams and how they react to each other. Thus it is known as the “head coach” approach as the role of both coaches is simulated in real time or in static frames (e.g. 9 frames of 10 minutes for a 90 minute football game). The Bayesian networks give probabilities of the potential outcomes as the frames progress (and the match respectively). After each frame up-to-date information is fed into the system so that the simulation is as flexible and realistic as possible [21]. In comparison, the statistical models can become unrealistic during a football game if a major event, which changes the complexity of the game, occurs e.g. a red card, injury of a key player, conceded goal, etc. That is because these models have static information about the squads and the offensive/defensive strengths of the teams.

2.2.7 Rule-based Combination of Forecasting Methods

Several studies analyse rule-based combinations of two or more of the forecasting methods in order to improve the accuracy rates. The idea is to create a forecasting environment that is closer to the real world situations when gamblers can select precisely on which games they place bets. Spann & Skiera have summarised the results from their tests when predictions, given by tipsters; predictions, suggested by betting odds; or predictions, related to shares on a prediction market agree on the expected outcome [13]. The accuracy rate of rule-based combination of all 3 forecasts is improved by 3.5% in comparison to the betting odds predictions. However, this result comes at the price of a fewer prediction selections – 380 games which is below 50% of the sample data they have used and the total profits in the test drop almost by half. In terms of profitability, the forecast combinations are scoring between 0.39% and 2.87% (12% tax which is equivalent to the online betting market) which is not significant enough to justify investment considering the risk involved [13].

	Rule-Based Forecasting				Weighting-Based Forecasting	
Instrument	i) PM and Betting Odds Agree	ii) PM and Tipster Agree	iii) Betting Odds and Tipster Agree	iv) PM, Betting Odds and Tipster Agree	50:50 forecasts [N=837]	50:50 forecasts [N=678]
Sample overlap[a)]	837	678	678	678	837	678
Number of forecasts[a)]	778	394	391	380	837	678
Forecast: Home win[b)]	631	322	330	321	652	528
Forecast: Away win[b)]	147	67	61	59	182	147
Forecast: Draw[b)]	0	5	0	0	3	3
Hit rate (%)	**53.98%**	**56.85%**	**56.52%**	**57.11%**	**52.69%**	**53.98%**
RMSE [c)]	**1.62**	**1.54**	**1.54**	**1.53**	**1.25**	**1.24**
Profit [d)] (25% fee)	**-9.86%**	**-7.64%**	**-9.08%**	**-8.72%**	**-13.12%**	**-8.15%**
Profit [d)] (12% fee)	**.39%**	**2.87%**	**1.26%**	**1.66%**	**-.59%**	**2.28%**
Profit [d)] (0% fee)	**12.44%**	**15.21%**	**13.42%**	**13.86%**	**11.47%**	**14.55%**
Total profit (0%) [e)]	**9,678 $**	**5,993 $**	**5,247 $**	**5,267 $**	**10,013 $**	**9,865 $**

Table 1: Rule-based combined forecasts; Spann & Skiera 2008.

Chapter III

3 Game Design

3.1 Idea

Predicting the correct results of sports matches is an interesting challenge to fans and pundits. Prediction games add a competitive edge to this challenge and provide a betting market experience to their users. Since the participants compete according to their individual expectations or follow popular public expectations, the predictions in such a game are spread according to the aggregated available information. Thus the prediction games can be considered a subdivision of a decision market and also highly similar in concept to the betting exchanges.

There are a number of sports prediction games online, which are focused predominantly on football if they are based in Europe. However, most if not all of these predictors are lacking some key features. The next section introduces a few of these games.

3.2 Football Predictors Overview and Scoring Systems

3.2.1 talkSPORT Predictor

"talkSPORT Predictor" is better known to the football fans as the *"I Know the Score"* competition, which used to feature on the official Premier League website as a sidekick to the *"Fantasy Premier League"* game until the end of season 2010/2011 when talkSPORT, a sports radio station, bought the rights. The media kept the game model but it also added the potential big prize of £1,000,000 if someone correctly predicts the outcome of all Premier League games in a single matchday which, however, is extremely unlikely and there are currently no records of a user claiming that prize.

There are five different types of scoring in a single football match: 10 points for a correct winner outcome, 15 points for a correct goal difference, 20 points for a correct draw outcome, 30 points for a correct result and 10 points are deducted for an incorrect prediction. There are a couple of bonus items, called *"The Banker"* and *"Insurance"*, that boost the score by a multiplier and prevent negative scores, respectively. This type of scoring is used in this project when calculating the success rate of the bookmakers' odds on correct football scores.

3.2.2 Predictfootballscore.com

This prediction game has been created in 2007 and features a number of top European leagues and international club and national competitions. The developers state that as the biggest advantage of the game over its competitors. However, the design of the website appears to be quite outdated and, when combined with a few misspellings, it leaves a feeling that the project is not very ambitious. A recent feature appears to be the ability to create *"Friend Leagues"* similarly to talkSPORT's mini leagues.

Another similarity is the scoring rules of the two games despite a few minor changes in the amount of points given for correct bets. One difference is that in Predictfootballscore.com there are no point deductions for incorrect bets. There are also no bonus items to adjust the score so the game is simpler but less exciting for the user with the lack of twists.

3.2.3 Predictthepremiership.com

"Predict the Premiership" is also a free-to-play prediction game which focuses on the English Premier League. The users play in divisions with a slightly more different setup than in the other two games. The format is head-to-head so they face another opponent every round and try to beat their score. A season in these divisions lasts for a calendar month after which the top 140 players get promoted to the higher division whereas the bottom 140 get relegated.

The scoring system rewards the users with base points and bonus points. The base points are similar to the other two games – 10 points for a correct outcome and 30 points for a correct result (when scaled to the talkSPORT's scoring system) but the interesting bit are the bonus points. If a user predicts the correct score when less than 20% of the opponents have got it right, they get 2 additional points and if less than 5% have the result correct, then the user is awarded 4 bonus points. I rate this system because of the fact that it rewards correct predictions of unlikely scorelines.

3.3 Improvements on the Scoring Approach

The rules of the talkSPORT Predictor scoring are summed up below:

+10 points for a correct outcome prediction, either a home or away win, but incorrect goal difference e.g. 3:1 prediction and 1:0 actual score
+15 points for a correct outcome and correct goal difference prediction, either home or away win, but incorrect result e.g. 2:1 prediction and 1:0 actual score
+20 points for a correct draw prediction, but incorrect result e.g. 1:1 prediction and 0:0 actual score
+30 points for a correct result prediction e.g. 1:0 prediction and 1:0 actual score or 1:1 prediction and 1:1 actual score
-10 points for an incorrect prediction e.g. 1:0 prediction and 1:1 actual score or 1:0 prediction and 0:2 actual score

Table 2: talkSPORT Predictor Scoring Rules

The results that are collected when following these rules do not correspond to profitability which is the key statistics when measuring the success rates of prediction methods. Main reason is the fact that an incorrect prediction that is off by 1 margin (predicted home win; actual result is a draw) takes the same penalty as a "completely" incorrect prediction (predicted home win; actual result is an away win). Being closer to the actual outcome in a larger number occasions results in a better chance of more successful predictions. A higher ratio between "correct outcome only" and "correct score" also would ensure that successful outcome predictions are rewarded better as part of the art of predicting the "correct score" is first to forecast the outcome of the game. Therefore, some modifications were required.

The revised scoring rules were designed for the "Beat the Tipster" prediction game and the research on the accuracy of the different prediction methods as they are more exhaustive and precise. The details are listed in the table:

+20 points for a correct outcome prediction, either a home or away win, but incorrect goal difference e.g. 3:1 prediction and 1:0 actual score
+30 points for a correct outcome and correct goal difference prediction, either home or away win, but incorrect result e.g. 2:1 prediction and 1:0 actual score
+30 points for a correct draw prediction, but incorrect result e.g. 1:1 prediction and 0:0 actual score
+50 points for a correct result prediction e.g. 1:0 prediction and 1:0 actual score or 1:1 prediction and 1:1 actual score
-15 points for an incorrect draw prediction e.g. 1:1 prediction and 2:0 actual score
-15 points for an incorrect outcome prediction, either a home or away win, where the actual score is a draw e.g. 1:0 prediction and 1:1 actual score
-30 points for an incorrect outcome prediction, either a home or away win, where the actual score is a win for the team you have predicted to lose e.g. 2:0 prediction and 1:2 actual score

Table 3: "Beat the Tipster" Scoring Rules

3.4 Game Features and Requirements Analysis

Sports prediction markets and prediction games are based on leagues in which the players compete against each other. The leagues are usually of two types – public and private. Public leagues can be the overall league including all registered players; the fans leagues for people supporting the same clubs; and local leagues which are usually based on the location of the players. Private leagues are created by groups of players and they require an authorisation code from any player who wants to join.

Rankings in the leagues can be based on the overall score or the score for a particular sports league e.g. German Bundesliga in football or National Hockey League (NHL) in ice hockey.

“Beat the Tipster” is designed to have a home page with information about incoming events on which the user can submit predictions; leagues page with information about the leagues that the user is part of – number of participants, weekly rank; and management of leagues – joining and removing leagues; predictions page where the users can enter their predictions for the outcome of the featured sports matches; leaderboards page with rankings of the users; user profile page – for game customization and preferences such as time settings and notifications, information on completed challenges and badges, message inbox.

The scoring rules, created for predicting the correct score of a football game, can easily be adapted to other low-scoring sports with 2 or 3 potential outcomes such as tennis and ice hockey while the points system for other sports such as rugby, basketball or motorsports can either be solely based on the correct outcome or based on a specified margin, known as points spread, by which the favoured team has to win for a successful bet [18].

3.5 Web Platform Design

The frond end design aims to support the game features described in the previous section. A navigation panel is located at the header of the webpage with quick links to the different sports pages, the predictions pages; the leagues pages (Figure 2); profile customisation pages and the help center. Tab navigation is an user-friendly feature and as such it is quite popular on various web platforms.

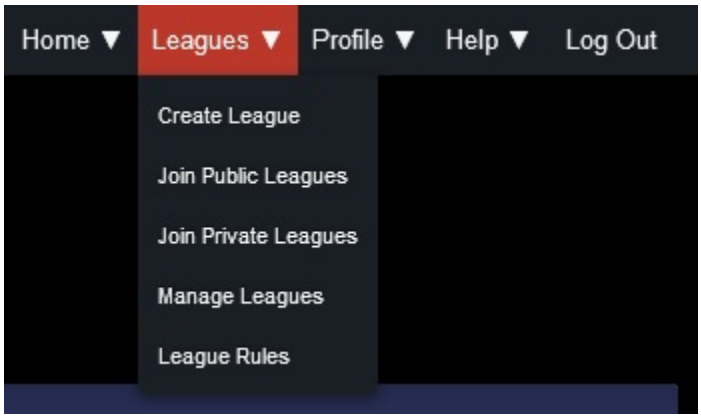

Figure 2: Navigation Panel

A fully interactive wireframe of a prediction page for the English Premier League is also designed. The body of the page includes a panel for local navigation that includes the league-specific information such as the past results and future fixtures as well as the standings table (Figure 3). On the left side of the frame there is a user rankings information and tabs buttons that redirect the user to the different features of the game. Quick links to private and public leagues are located on the right side of the frame. The layout is grid-based as it as an effective way to organize the large amount of contents required.

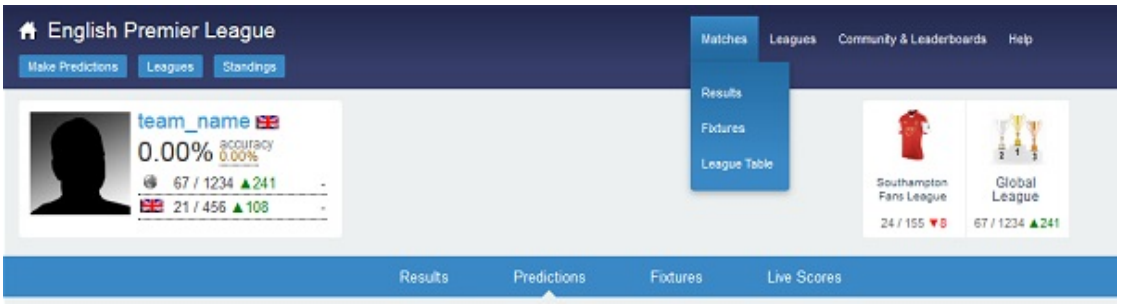

Figure 3: Prediction Page – Profile & Links

The next matchday fixtures are located in the main body of the predictions page for the league page. In the wireframe all the games in a round of the English Premier League are open for predictions. Team kits are used so that the users can easily identify the teams involved in the fixture. The match panel also has information about the teams' latest 5 games in the competition; the date and start time of the game dependent on the time zone of the user; the stadium where the game is played and two dropdown buttons where the predictions are entered (Figure 4).

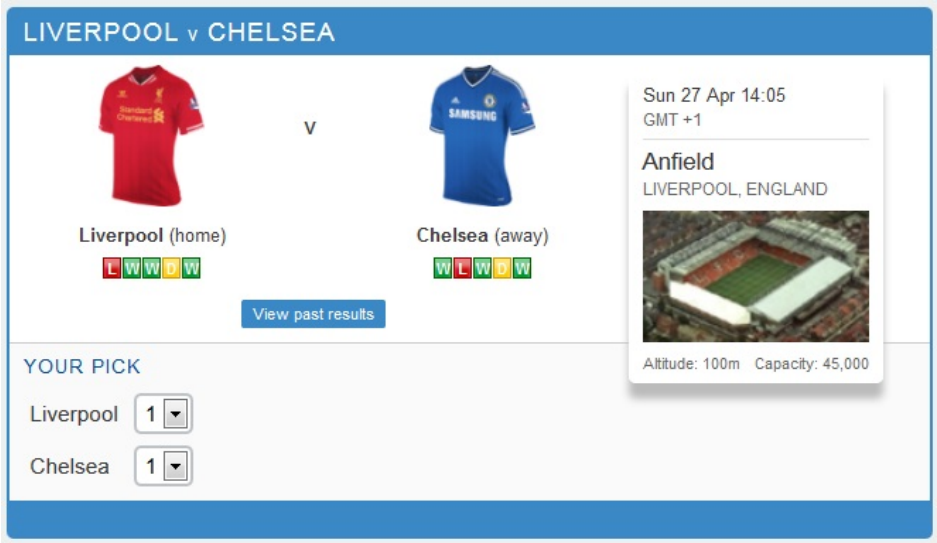

Figure 4: Prediction Page – Football fixture

Text fields are not used so that the user cannot enter invalid prediction, either by mistake or if trying to explore webpage vulnerabilities. A button for predictions submission is located at the bottom of the webpage body below the last matchday fixture (Figure 5).

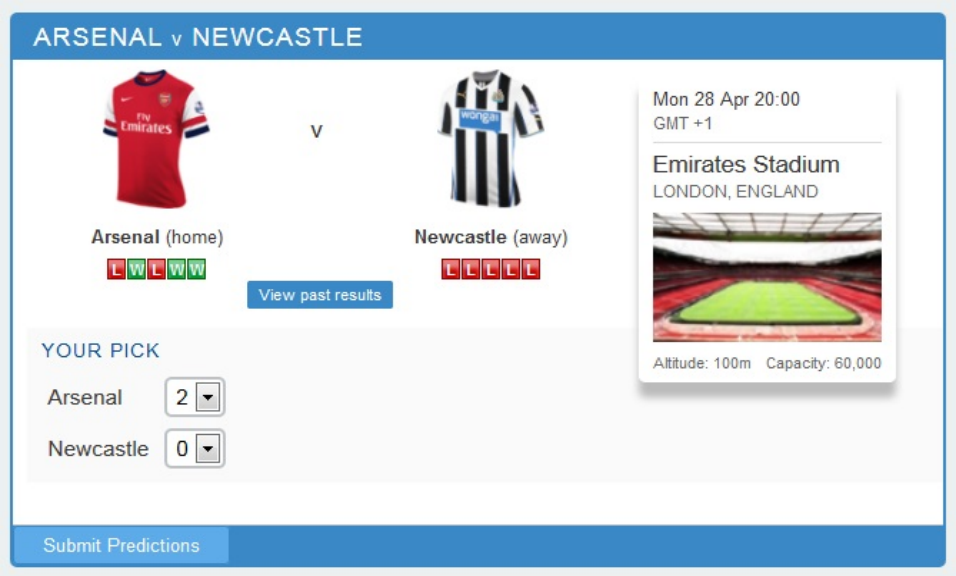

Figure 5: Prediction Page – Prediction Submission

Chapter IV

4 Prediction Methods Accuracy in Game Environment

4.1 Experts

The expert predictions of two different tipsters are analysed for the purposes of the report. Both of them are publishing their correct score predictions for the English Premier League football games. One of the experts is the former professional footballer and Ireland international Mark Lawrenson. After his football career, Lawrenson has worked for the BBC, TV3 and Today FM as a television and radio football pundit. He has had a weekly column in the BBC Sports website where he gives correct score predictions for the following weekend games in the English Premier League (and FA Cup) games. Predictions of one guest, who is usually a famous sportsman, politician, journalist, actor or musician, are also published each week as these people try to beat the Lawrenson's weekly score. However, the report is not going to analyse the success rates of the guests as their predictions are not consistent enough to formulate a qualitative result. The scoring used in these weekly head-to-head between the host and the guest is as follows: 3 points for a correct score prediction, 1 point for a correct outcome prediction, 0 points for an incorrect prediction.

The second expert featured in the studies is Borislav Borisov who is working as a football commentator for Diema TV [22]. Similarly to Lawrenson, he is publishing his correct score predictions before every matchday weekend in a column on the media's website.

4.1.1 Criteria

The scoring model, developed for the "Beat the Tipster" game, is used in the analysis of the experts' predictions success rate. The data sets of both experts are not equivalent so in order to accurately evaluate their results, the pundits' prediction scores are converted into a Points per Game (PPG) measurement which is practically the overall sum of points for each matchday or season divided by the number of predicted football games.

4.1.2 Mark Lawrenson, BBC

4.1.2.1 Strategy

Mark Lawrenson is fairly conservative when it comes to his tips. An analysis of the actual scoreline predictions, which are forecasted by him in the first half of 2011/2012 EPL season, reveals that Lawrenson goes for either 2:0, 2:1 or 1:1 in more than three quarters of the cases (77.3%). This suggests that he is playing safely, either deliberately or subconsciously, not only with the most likely outcome but also with one of the most likely correct scorelines (Table 4). In an interview, he confirms that: *"I probably only go for away wins for the top half dozen teams, because teams below them don't win too many away games. And perhaps I don't predict drubbings because I don't want to upset fans of the losing side."* [23].

Score	Predictions	% Predictions	Actual Occurrences	Actual % Occurrences
0-0	2	1.3%	14	8.9%
1-0	3	1.9%	19	12.0%
0-1	1	0.6%	4	2.5%
2-0	51	32.3%	8	5.1%
0-2	10	6.3%	5	3.2%
1-1	38	24.1%	24	15.2%
2-1	33	20.9%	15	9.5%
1-2	14	8.9%	9	5.7%
3-0	6	3.8%	7	4.4%
Total	158		105	66.5%

Table 4: Breakdown of Mark Lawrenson's correct score predictions and actual occurrences of these results

Lawrenson's forecast process appears to be usually confirming the aggregated expert opinion in the betting markets but there is nothing wrong with such approach as the results of Lawrenson's success rate show. A large portion of the bookmakers' profits is in the large odds with poor actual value so holding back from doing too risky bets can be a profitable strategy.

4.1.2.2 Data Set

The data set includes Mark Lawrenson's predictions for the 342 English Premier League (EPL) games played in the 2013/2014 season until April 21st, 2014; as well as all the 380 EPL games in 2010/2011, 2011/2012 and 2012/2013 seasons [24]. Each EPL season consists of 38 matchdays with 10 games each as long as there are no changes in the fixture schedule due to European tournaments (Champions League and Europa League) and English cup (F.A. Cup and Capital One Cup) games.

4.1.2.3 Results

Lawrenson's predictions are quite successful in the realm of tipster predictions. Moreover, the results of the 4 EPL seasons case study (2010/2011 to 2013/2014) reveal that his success rate is constantly improving (Table 5).

Season	Correct Scores (+50)	Correct Outcome, Correct GD (+30)	Correct Outcome, Incorrect GD (+15)	Correct Draw, Incorrect GD (+30)	Incorrect Outcome by 1 margin (-15)	Incorrect Outcome by 2 margins (-30)	Overall Predictions
2010/2011	41	31	81	15	147	65	380
2011/2012	41	26	94	18	138	63	380
2012/2013	44	32	104	20	114	66	380
2013/2014	39	26	102	18	98	59	342

Table 5: Mark Lawrenson's predictions - summary over 4 English Premier League seasons

Using the "Beat the Tipster" scoring, Lawrenson's overall season result jumps from 895 points (2.36 PPG) in the 2010/2011 campaign to 2000 points (5.26 PPG) in 2012/2013. His current 2013/2014 season score would be even more impressive standing at 2070 points (6.05 PPG) for 347 EPL games. The last 3 matchdays of each of the previous seasons in this case study has been slightly above par for Lawrenson averaging 1.1 correct scores, 3.8 correct results and 5.1 unsuccessful predictions which could potentially add to 2210 points (5.82 PPG) for the whole 2013/2014 season (Table 6).

Season	Overall Predictions	BTT Points	BTT PPG
2010/2011	380	895	2.36
2011/2012	380	1290	3.39
2012/2013	380	2150	5.66
2013/2014	342	2070	6.05
2013/2014 (expected)	380	2210	5.82

Table 6: Mark Lawrenson's predictions – "Beat the Tipster" Scores

It has been evaluated in a "BBC" article, which reviews Lawrenson's predictions for the 2012/2013 season, that he has correctly predicted the outcome of 200 of the 380 games resulting in a 52.63% success rate whereas the bookmakers odds method (i.e. taking the shortest odds for a home/away win or a draw as a prediction) has had a success rate of 52.36% with 199 correct outcomes. However, the more important measurement criteria is the profitability of the predictions as it is generally easier to predict the outcome when there is a clear favourite in a sports game and such a successful prediction brings smaller profits compared to a game where both teams are more evenly matched. The results show that if an imaginary bookmaker's client has staked £3800 over the course of the season on the shortest bookmakers' odds, £10 per each game, this client would have had returns of £3510.90 or practically losses of £289.10 (-7.61%). However, if the very same client had staked £10 on each game following the predictions of Mark Lawrenson, then the returns would have been £3986 or practically profits of £186 (+4.89%). Any positive result can be classified as "beating the bookmakers" so the profitability results are excellent.

4.1.3 Borislav Borisov, Diema

4.1.3.1 Strategy

In some of his football match reviews and articles Borislav Borisov has discussed that his predictions are based not that much on statistical data and public expectations but rather on the style of play of the two opponents in every game and the form that the teams are going into a game. Examples of that strategy are teams that usually struggle to overcome tight and disciplined defending; teams that are susceptible to counter-attacking football or teams that concede many goals from set pieces; and when the opposing team's strengths are matching such potential weaknesses, Borisov's predictions are amended even if the public expectations and the betting odds do not favour such a bet. Football statistics platform "WhoScored" are notorious for quantifying such data and including it in their match previews:

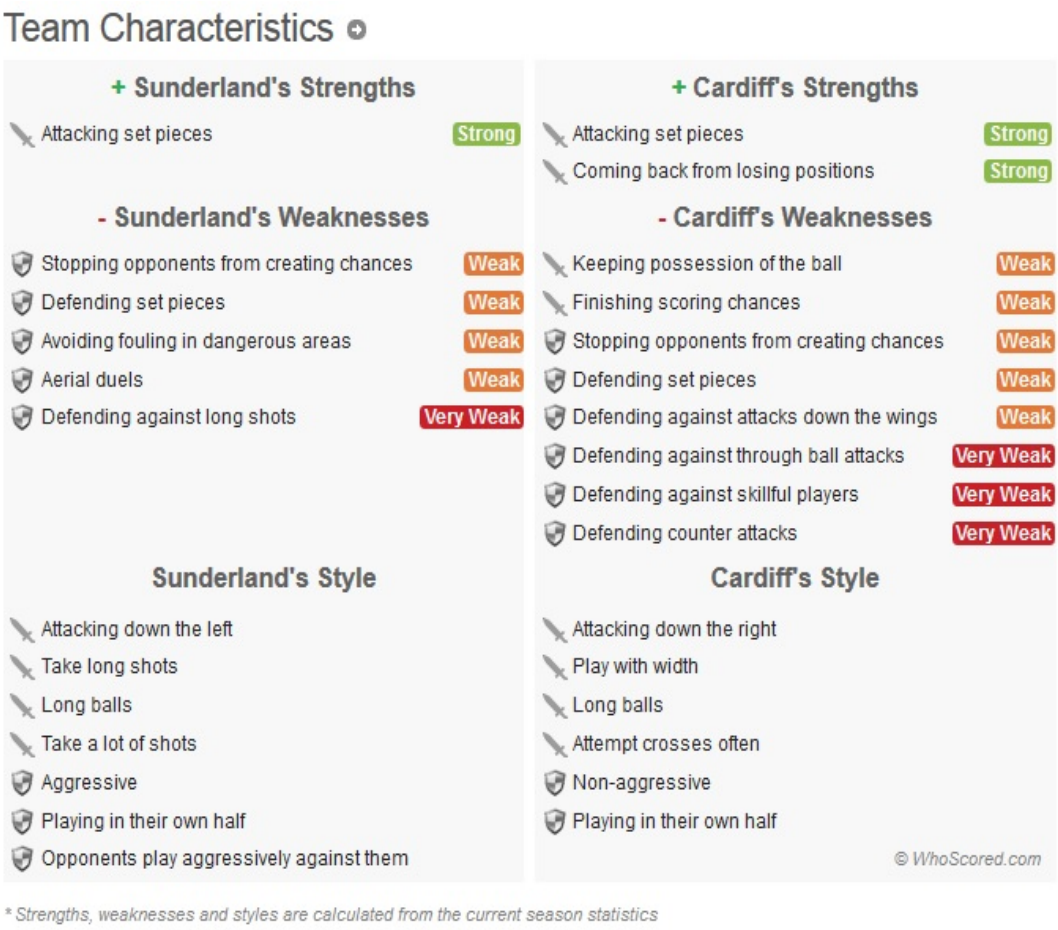

Figure 6: "WhoScored"'s Team Characteristics Summary; Sunderland – Cardiff (27.04.2014)

Figure 6 shows a summary of the two teams' strengths and weaknesses as well as their style of football in a two-column table. These key facts are included in the preview of an EPL game between Sunderland and Cardiff [25]. The characteristics are extracted from the season statistics for both teams. Then the algorithms, that "WhoScored" are using, link together the data to form a consilience on the potential events that presumably will happen during the game.

In the particular example, the data shows that Sunderland are relying heavily on set pieces such as indirect free kicks, corners or penalties to add to their goal tally whereas Cardiff has conceded a high number of goals from set pieces. The vice versa argument is also valid. Therefore the forecast marks the events of set piece goals for both teams as likely to occur.

Figure 7: "WhoScored"'s Match Forecast; Sunderland – Cardiff (27.04.2014)

In the actual game, Sunderland has come on top with a 4:0 victory. The reported commentary of 3 of the 4 goals is as follows and it squarely confirms the match forecast in Figure 7: "Wickham was left unaccompanied beyond the far post to meet Sebastian Larsson's corner and head it back across goal and inside the upright to make it 1:0", "Borini nervelessly converted the penalty to double Sunderland's lead" and "Wickham applied the icing to the cake with four minutes remaining when he headed home the Giaccherini's corner" [26]. Therefore, there is every reason to expect such forecasts to apply correctly to a game that is previewed since adapting and utilising the opponent's weaknesses are key tactical principles in every sport.

4.1.3.2 Data Set

Borisov has not entered predictions for 8 matchdays resulting in a data set of 264 EPL games in the 2013/2014 season. Unfortunately none of his predictions in previous EPL seasons are archived.

4.1.3.3 Results

Because of the discussed forecasting strategies of Borisov, his predictions can be classified as riskier than what the average bookmaker will offer or what most of the experts would predict. Examples of his successful bets in the 2013/2014 EPL season are games such as Manchester United – Southampton 1:1 (correct score prediction: 7.73 decimal odds or +673% profit); Fulham – Sunderland 1:4 (correct outcome prediction: 3.80 decimal odds or +280% profit); Southampton – Arsenal 2:2 (correct result prediction: 17.00 decimal odds or 1600% profit); Norwich – West Brom 0:1 (correct goal difference prediction: 4.67 decimal odds or +367% profit).

However, not backing the favourite in a substantial number of games while betting on a more unlikely result inevitably leads to a lower number of correctly predicted outcomes. Borisov has successfully predicted the outcome of 117 matches or 44.3% of the data set which is 8-10% lower than the results of the other pundits, discussed in this report. As a result, Borisov's "Beat the Tipster" PPG is 1.53 which is also significantly lower than Lawrenson's in the current season.

The analysis of the different predicted outcomes reveals that he has struggled to correctly predict draw outcomes in the majority of his bets as he has only 6 "correct score" draws and 4 "incorrect score but correct outcome" draws out of 74 draw predictions (13.5% success). This is also partly due to the frequently used "not backing the favourite but predicting a surprising draw" strategy.

Type of Prediction	Total Predictions	Correct Outcomes	% Correct Outcome
Home win	128	81	63.3%
Draw	74	10	13.5%
Away win	62	26	41.9%
Overall	264	117	44.3%

Table 7: Borislav Borisov's Predctions Summary

On the other hand, Borisov's home win predictions are quite trustworthy – he has had 11 "correct score", 10 "incorrect score but correct goal difference" and 60 "correct outcome only" home win bets out of 128 bets (63.3% hit rate). A review of the EPL league table after the 35th matchday covering Borisov's data set, shows that the top 5 teams have the following home records: Liverpool – 15 wins in 17 games (88.2%); Chelsea - 15/18 (83.3%); Manchester City – 15/17 (88.2%); Everton – 13/18 (72.2%); Arsenal – 11/17 (64.7%). Therefore, it is reasonable although not highly profitable to bet on these top teams when they are playing at

home turf. This is what Mark Lawrenson is predicting in above 95% of the cases unless these top 5 teams are playing each other and his home win record stands at 68.1% hit rate in comparison.

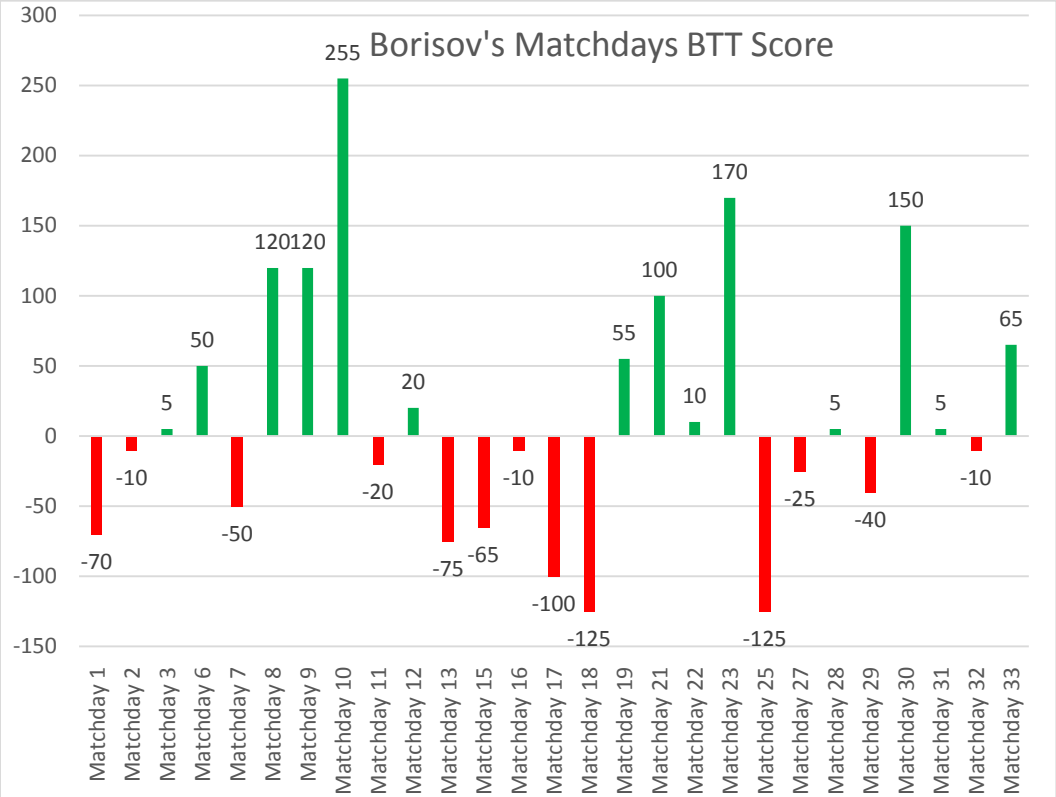

Figure 8: Borislav Borisov's "Beat the Tipster" Scores for the predicted Matchdays

The Figure 8 reveals that Borisov is often having a streak of consecutive successful (green) or unsuccessful (red) matchdays. Interestingly, matchdays where no predictions have been made do not usually break these streaks as it could have been speculated that in weeks when the pundit has been too busy to write the matchday preview with the predictions, he has had no time to carefully evaluate all the opponents in the matches. That is not the case though but the overall results are still inconsistent compared to Lawrenson's PPG (Figure 9).

Season	Overall Predictions	BTT Points	BTT PPG
Lawrenson in 2013/2014	342	2070	6.05
Borisov in 2013/2014	264	405	1.53

Figure 9: Mark Lawrenson's and Borislav Borisov's prediction results – "Beat the Tipster" Scores

4.1.4 Profitability Results of Other Studies

Further profitability analysis of the "25/7 Sports" blog compare the performance record of Mark Lawrenson, "BBC" with two other former British footballers who are currently working as pundits for TV and radio stations - Lee Dixon, "ITV Sport" and Andy Gray, "TalkSPORT". All the predictions that are considered are for the EPL 2012/2013 season. The study has been conducted mid-season so the data set is fairly small having less than 225 games for each of the pundits.

Mark Lawrenson's results are based on 208 EPL matches and it is not a surprise that they overlap the conclusions in the "BBC" article as both studies encompass large fractions of the same data. It is estimated that 51% of Lawrenson's outcome predictions are successful with an average betting odds for the winning prediction of 2.08 in decimal odds (27/25 in fractional odds). Thus the returns with the £10 example from the previous section would be £2336.26 with £2080 at stake or clear profits of impressive £256.26 (+12.3%)

Lee Dixon is also a TV pundit who used to publish football analysis and predictions articles online at the "Betfair" betting exchange blog. The data, that "25/7 Sports" have collected, for him includes only 35 EPL games and cannot precisely serve as a comparison between his performance and the other pundits. Dixon's success rate is 51% as Lawrenson's whereas the average decimal betting odds of these winning predictions are 2.25 (5/4 in fractional odds). The success rate and the higher average winning odds mean that Dixon's predictions would return £427.50 with £350 at stake (£10 per 35 games) or clear profits of £77.50 (+22.1%).

Andy Gray is another famous British former footballer who used to be the primary football pundit for the "Sky Sports" as well as running a column for Irish bookmakers "PaddyPower". His data set size is comparable to Lawrenson's (208 EPL games) from the same study with 190 EPL games. Gray's success rate is 50.2% which is as similar as possible to Lawrenson's and Dixon's 51%. The average odds of the winning predictions are 1.95 (20/21 in fractional odds) and thus the returns would be £1963.65 with £1900 at stake (£10 per 190 games) for clear profits of £63.65 (+3.4%).

Pundit	Number of Predictions	% Successful Predictions	Average betting odds on winning predictions	Profits	% Profits
Lawrenson	208	51.3%	2.08	£256.26	12.3%
Dixon	35	51.1%	2.25	£77.50	22.1%
Gray	190	50.2%	1.95	£63.65	3.4%

Table 8: Comparison between the predictions success rate and profits

4.2 Bookmakers Odds

Throughout the time of the project, data was collected about 411 football games from the "Correct Score" markets. The lowest three to seven betting odds and the respective results (Figure 10) were gathered from the "Paddy Power" betting platform for fixtures in the top European leagues such as English Premier League, Spanish La Liga, German Bundesliga, Italian Serie A as well as European club tournaments - Champions League and Europa League; and also international games such as World Cup 2014 qualifiers and international friendly games.

Italian Seria A	Column1	Result #1	Odds #1	Result #2	Odds #2	Result #3	Odds #3
Catania	Udinese	1:1	5.50	0:0	7.50	0:1	7.50
Inter	Livorno	2:0	6.00	1:0	7.00	2:1	7.50
Genoa	Verona	1:1	5.50	1:0	7.00	2:1	8.50
Atalanta	Bologna	1:1	5.50	1:0	6.00	0:0	7.50
Cagliari	Torino	1:1	5.50	1:0	6.50	0:0	8.00
Chievo	Milan	1:1	6.00	0:1	6.50	1:2	8.50
Parma	Lazio	1:1	5.50	1:0	8.00	2:1	8.00
Roma	Sassuolo	2:0	5.50	1:0	6.50	3:0	7.50
Fiorentina	Sampdoria	1:0	6.50	2:0	6.50	1:1	7.50
Juventus	Napoli	1:1	6.50	1:0	7.00	2:1	7.50

Figure 10: Lowest three correct score betting odds for a matchday in Serie A

4.2.1 Initial Testing

The scoring system used for the initial tests was the talkSPORT Predictor's one. The data was analysed for patterns and dependencies. Calculations were made on the average points per fixture for all the matches in a certain league or competition when taking the top 3 betting odds (the top 3 odds are the lowest 3 odds which therefore have the biggest likelihood of occurring when converted into percentages).

Premier League	Odds #1	Odds #2	Odds #3
Score:	225	90	170
Games:	40	40	40
PPG:	5.625	2.25	4.25

Table 9: English Premier League – PPG Results for lowest 3 betting odds

Championship	Odds #1	Odds #2	Odds #3
Score:	110	185	55
Games:	40	40	40
PPG:	2.75	4.625	1.375

Table 10: Championship – PPG Results for lowest 3 betting odds

Six of the seven leagues that were initially analysed had a "ʎ" (Table 9 – Premier League) or "V" shaped (Table 10 – Championship) results when the PPG for the three lowest odds was plotted on a graph. The reason for this is that when a particular fixture is more difficult to predict and can realistically finish with a win for either team A or team B, the best 3 odds tend to be in the following pattern: lowest odds favour a result for team A, second lowest odds favour a draw result, third lowest odds favour another result with team A winning. This way the average PPG for Odds #1 and Odds #3 are similar when taking a large set of games whereas Odds #2 have proved either better ("ʎ" shape) or worse ("V") than the other two. The competition that do not follow this pattern was the Champions League which did not see many surprising outcomes in the group stages in season 2013/2014 and therefore the PPG with Odds #1 was higher than both the PPG with Odds #2 and the PPG with Odds #3. A common case, if we use team A and team B again, in a Champions League game is that the lowest odds and the second lowest odds favour a team A win whereas the third odds are the lowest one for a more surprising outcome which does not occur often in the sample. That explains why Odds #1 and #2 have positive PPG whereas #3's PPG was standing at -3.50.

The success rate when using the most likely outcome, according to the bookmakers odds, was very reasonable as in 4 out of the 7 competitions tested the PPG is over 5.5 (Figure 11, the Bundesliga is not plotted) which is a solid result when using the talkSPORT's scoring system.

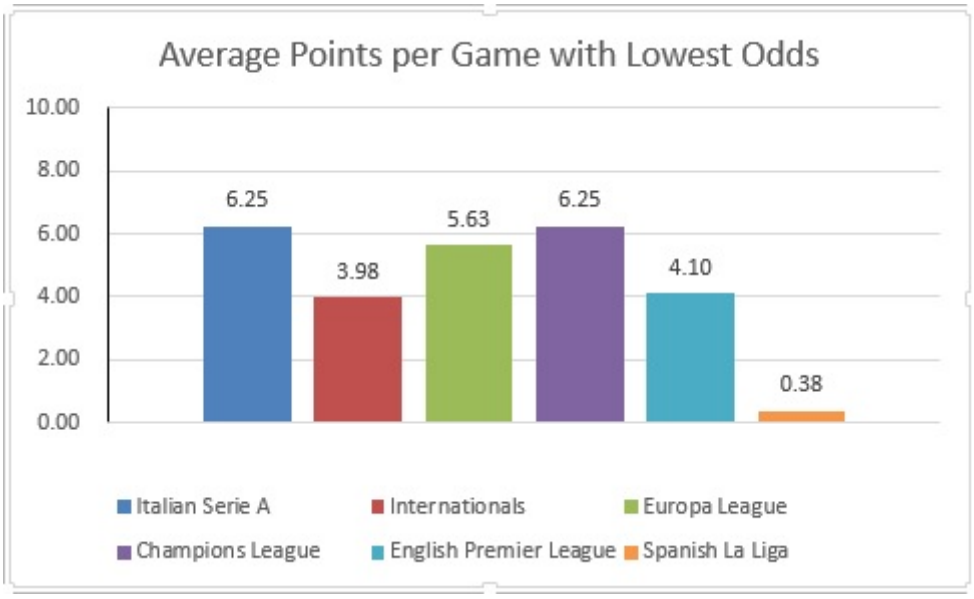

Figure 11: PPG with Odds #1 in different leagues

4.2.2 Weighted Random Number Forecasting

The idea behind this approach is that a sports encounter such as a rugby game or a basketball game can involve literally millions of decisions, taken by the players of the two teams. The way they have played a particular through ball or whether they have succeeded when trying to tackle an opponent can change, in theory, the course of the game into a completely new direction at least until the next stoppage of the game after which both teams can recuperate.

In an attempt to match these random events with the drawing a random number out of 100, a data set of 60 football games is used. The lowest 5 odds are taken from the "Correct Score" market for each of these games and the decimal odds are converted into probabilities adding to 100% as in the example below:

	Odds #1	Odds #2	Odds #3	Odds #4	Odds #5
Decimal odds	7.00	7.50	8.00	9.00	10.00
% Probability	23.33	21.78	20.41	18.15	16.33

The random number can fall in one of these 5 categories when we specify them in the following way.

Odds #1: from 0.01 to 23.33
Odds #2: from 23.34 to 45.11
Odds #3: from 45.12 to 65.52
Odds #4: from 65.53 to 83.67
Odds #5: from 83.68 to 100

Thus the predicted result is the one that has been randomly drawn out of the best 5 options. The results of these 60 games reveal that this strategy is very inconsistent. The average PPG is 0.62 with the "Beat the Tipster" scoring which is significantly lower than the pundits and the lowest odds strategy. The losses stand at -11.7% which is also not a satisfying result.

	Number of Predictions	% Successful Predictions	Average betting odds on winning predictions	Profits	% Profits
Lawrenson	208	51.3%	2.08	£256.26	12.3%
Random Weighted Draw	60	38.2%	1.67	-£85.12	-11.7%

Table 11: Comparison between pundit and RWD strategy

4.2.3 Estimated Scores from Bookmakers Odds (ESBO)

This strategy is designed to meet the scoring rules of the "Beat the Tipster" game. It builds a decision network for the likely outcomes of a sports game and compares the estimated scores in the game environment in order to select the highest expected one and the related outcome and correct score. It is an improvement over the initial tests which confirmed the success of the bookmakers' odds as a predictor and a comparison between the two methods' results is presented in this section.

An example case is reviewed to explain the process. The betting odds are taken for the Champions League match between Zenit St. Peterburg and Borussia Dortmund, played on 25 February 2014. The first step is to convert the betting odds for the 5 most likely outcomes into percentages as in the previous approach. It is calculated using the Python script as the procedure is explained in Section 2.2.3 of this report.

	Odds #1	Odds #2	Odds #3	Odds #4	Odds #5
Betting odds	7.00	8.50	9.00	10.00	13.00
Corresponding result	1:1	1:2	0:1	0:2	2:1
% Probability	26.04	21.45	20.26	18.23	14.02

Table 12: Probability of the most likely 5 results in a Zenit St. Petersburg – Borussia Dortmund, Champions League match, 25.02.2014

A decision network is built for the five possible outcomes by calculating the expected "Beat the Tipster" (BTT) game environment score. If the expected results related to Odds #1 to #N are denoted as E_1 to E_N, the potential actual results – A_1 to A_5 , the BTT scores for two results as (E & A) and the probabilities of each of these results occurring as P_1 to P_N then the formula to calculate the ESBO for Ex is as follows:

$$E_x = P_1 * (E_x \,\&\, A_1) + P_2 * (E_x \,\&\, A_2) + \ldots + P_N * (E_x \,\&\, A_N)$$

The equivalent Python code:

```
    #**************** case 1 ******************

    predicted_score = result1
    #case 1.1:
    actual_score = result1
    sum_result1 =
float(odds1_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result1

    #case 1.2:
    actual_score = result2
    sum_result1 = sum_result1 +
float(odds2_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result1

    #case 1.3:
    actual_score = result3
    sum_result1 = sum_result1 +
float(odds3_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result1

    #case 1.4:
    actual_score = result4
    sum_result1 = sum_result1 +
float(odds4_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result1

    #case 1.5:
    actual_score = result5
    sum_result1 = sum_result1 +
float(odds5_chance_to100/100*find_cell(actual_score,
predicted_score))
    print "Esimated score for prediction " + predicted_score +
": " + "%.2f" % sum_result1
    #**************** end case 1 ******************
```

The formula is valid for more or less than 5 lowest betting odds depending on algorithm efficiency. Converting the betting odds for the Zenit – Borussia game above would result in the following ESBO scores:

	Odds #1	Odds #2	Odds #3	Odds #4	Odds #5
Betting odds	7.00	8.50	9.00	10.00	13.00
Corresponding Result	1:1	1:2	0:1	0:2	2:1
ESBO	1.93	12.33	12.09	9.34	-14.87

Contrasting to the lowest odds strategy which would predict a 1:1 draw, ESBO uses more of the available information and since the Odds #2-4 agree on an away win, the ESBO rating of this prediction is higher. An ideally trained agent would use all the market information but this comes at an efficiency cost. Multiple tests confirmed that 5 to 7 betting odds is an optimal amount of information.

4.3 Final Results

The experts' PPG results reveal that their predictions are comparable and in some data sets even better than these of data-rich statistical models which contradicts the claims of Forrest & Simmons [9] in their series of studies of football tipsters' performance. The reason behind this fact might be the highly competitive bookmaking market which has made the inefficient forecasting way too costly over the last 10 years since the paper was published.

After collecting the final data towards the end of the project, calculations were done on all the 411 football games in the different leagues. Firstly, the results for the lowest booking odds strategy are summarised in Table 13. The successful outcome predictions are similar to forecasting, which is based on the 1X2 (correct outcome market) betting odds from the prediction markets or the bookmakers, with success rate of 50.85% for all the 411 games. This is not surprising as the betting odds of the Win markets and the Correct Score markets are balanced to cover analogous expectations. A gambler cannot expect to make profit using this strategy as the profitability appears to vary between -1% and 2% with no tax reducing the net winning income.

Leagues	Games Predicted	Overall Points	PPG	% Success Rate	% Profitability
Champions League	32	160	5.00	48.48%	-0.21%
Europa League	54	500	9.26	51.85%	0.17%
Premier League	79	515	6.52	53.16%	0.10%
La Liga	59	230	3.90	45.76%	-0.26%
Bundesliga	26	270	10.38	57.69%	1.39%
Seria A	30	180	6.00	46.67%	-0.09%
Internationals	80	630	7.88	52.50%	0.12%
Overall	411	2775	6.75	50.85%	0.27%

Table 13: Summary of lowest odds strategy success in different football leagues

The ESBO Ratings outperform the lowest odds strategy in success rate and scores high profitability percentages because it allows for a very effective prediction of draw results, which the betting market prices on average at 3.46 (+246% profit). In overall, the average winning prediction odds are 2.21 (+130% profit). ESBO is a reflex and goal-based intelligent agent that practically uses more of the available betting information to decide on the forecast. The PPG is 13% higher with 7.63

compared to 6.75 which not only suggests that it is a better strategy for the "Beat the Tipster" game environment but also more predictions have been successful on the Correct Score market where the betting market prices average 6.42 (+542% profit). ESBO's profitability percentages are more inconsistent when different leagues are tested but with a large enough pool of games, it is steadily positive and allows for profits to be made.

Leagues	Games Predicted	Overall Points	PPG	% Success Rate	% Profitability
Champions League	16	105	6.56	56.25%	4.86%
Europa League	30	325	10.83	56.67%	6.42%
Premier League	52	460	8.83	55.77%	6.15%
La Liga	19	245	12.89	68.42%	18.51%
Bundesliga	21	-135	-6.42	28.57%	-36.15%
Seria A	20	140	7.00	40.00%	-3.12%
Internationals	63	515	8.17	58.73%	5.66%
Other	11	60	5.46	45.45%	0.70%
Overall	232	1770	7.63	52.59%	5.12%

Table 14: Summary of ESBO Rating strategy success in different football leagues

Chapter V

5 Project Management and Planning

5.1 Project Management

A vital part of any project is to keep track of its progress. The final Gantt Chart that contains the major project tasks is available in the Appendix. The project was heavily research based and as a result many of the tasks ran throughout the whole project in order to collect the required data. The development of the web platform design was iterative but the implementation and testing times were underestimated and as a result a designed mockup was produced only. However, it is straightforward to build on the completed design and to use the findings of the project so that the platform is completed outside the scope of the project.

5.2 Software Tools

5.2.1 ESBO Algorithm Development

- **xlrd v0.9.1** - a Python module for extracting data from Microsoft Excel spreadsheet files. It was used to collect information from the Scoring Table (Appendices C, D, E)
- **Git –** version control system for the website development and Python algorithms
- **Microsoft Excel** – the betting odds data was collected in spreadsheets. The relevant charts and statistics were also created in MS Excel.
- **Komodo IDE** – an editor that supports version control and Python debugging

5.2.2 Web Development

- **Django** - a back-end web framework
- **Komodo IDE** – it is also suitable for web development and supports HTML, CSS and JavaScript

5.3 Risk Management

Table 15 outlines the potential risks that were identified in the beginning of the project and the mitigations that were taken so that the impact of these events occurring is reduced.

Risk	Likelihood H/M/L	Impact H/M/L	Action
Accidental/undesired alteration or deletion of algorithm code	M	M	The version control system allows a backup of the latest stable version of the code
Loss of Documentation and/or Betting Odds Data	L	M	Online platforms such as oddspotal.com offer Monitoring Service over betting data and keep history for the latest season
Loss of Documentation	L	M	The spreadsheets with the forecasting data and any other important documentation is backed up frequently on 2 local drives, on ECS servers and on Git/Dropbox
Servers being down	H	L	Code Implementation or research work can continue on a local drive as
Scope of the project being too unrealistic	M	M	Contingency is built into the project plan as the web platform will be designed only but not implemented
Ethical issues with the Prediction/Gambling platform	L	M	Contingency is built into the project plan as the web platform will be designed only but not implemented

Table 15: Risk Analysis

Chapter VI

6 Evaluation and Further Work

6.1 Comparative Evaluation to Other Forecasting Methods

The ESBO algorithm makes use of the betting odds for the reasons of data efficiency and the fact that betting market prices are generally the best indication of a future event's probabilities to occur in a certain way. The market aggregates all the available public information that is relevant to the outcome of the event.

As confirmed in section 4.3, the ESBO algorithm, developed during this project, slightly outperforms the other forecasting techniques, which were thoroughly tested on a similar set of data, both in terms of profitability and overall score in prediction game environment. It makes use of all the available "Correct Score" market information and manages to successfully predict outcomes with higher average winning odds than the other techniques. The success rate is not as high as the methods that make use of Bayesian Networks or the rule-based approaches but on the other side, the successful high-profit bets make up for it (Figure 12).

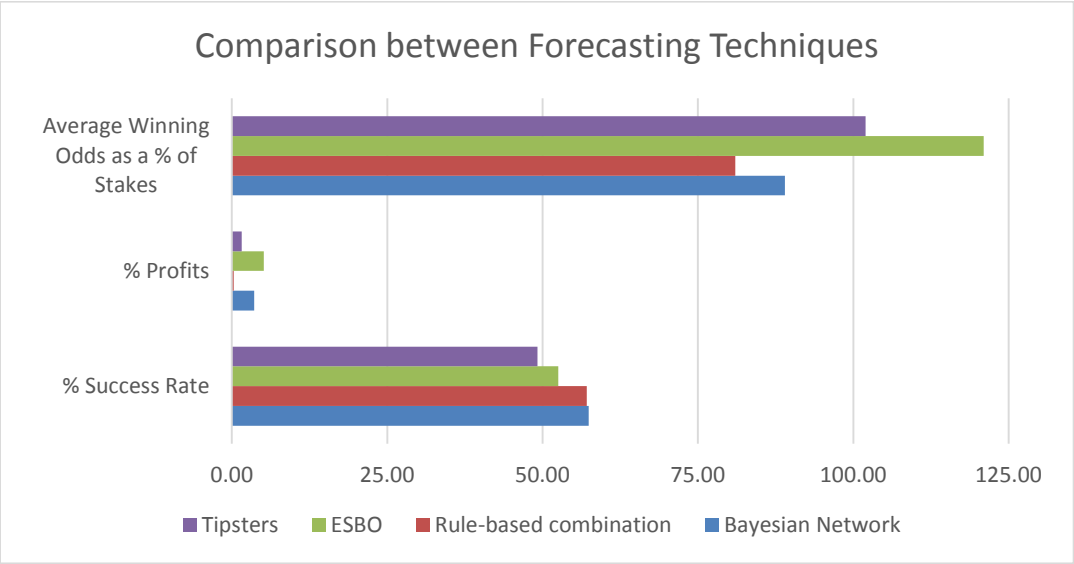

Figure 12: Empirical Comparison between Forecasting Techniques

There is a room of success rate improvement if further rules and weightings are implemented. The problem with these is that the set of predictions drastically drops and more importantly the winning odds average drops as the rule-based predictors tend not to look for a good value bets but rather for as certain as possible outcomes. As no future events that are available on the betting market happen with a certainty there is usually a better value available. In the case study of this research, football draws are a good source of profits if a predictor can hit a success rate of above 30% when forecasting draw outcomes.

6.2 Web Platform Evaluation and Further Work

The appearance of the mockup design is neat and makes use of external CSS and JavaScript libraries such as Bootstrap.

The idea and the design of the game can be implemented into a successful business plan. It is an advantage that there is not a single worldwide leader in such prediction games as it is in other market areas. The sports betting market is an enormous industry which is constantly growing but the majority of predictor games are not as nearly popular. A future target for this project is to make use of the research that was undertaken on sports forecasting and the game design so that the prediction platform “Beat the Tipster” is implemented either as an autonomous online game or as an expansion to a current sports site.

Chapter VII

7 Conclusion

This project reviews the problem of sports forecasting and the accuracy of different approaches such as statistical models, Bayesian networks and machine learning techniques, bookmakers and betting exchanges odds and rule-based combinations of these. A data set of 411 football games, played in the current 2013/2014 season, is used to implement new forecasting strategies which make use of the available bookmakers odds. The final forecasting implementation makes use of the betting market odds which reflect on the aggregated public opinion. Called ESBO (Estimated Scores from Booking Odds), it is a reflex and goal-based intelligent agent that practically makes the most of the available betting information to forecast an event.

The results reveal that profitability is possible as the success rate of the developed ESBO predictor has a slight advantage in comparison to the tipster, the betting exchanges and the bookmakers market odds. Thus it is possible to gain profits if the rules are strictly followed but the margins of 2-5% expected profitability are significantly lower than what some of the studies in the last 10 years have shown to achieve. The reason for that is the highly competitive bookmaking market which does not allow inefficient forecasting to survive the market.

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9 Appendices

A. Project Brief

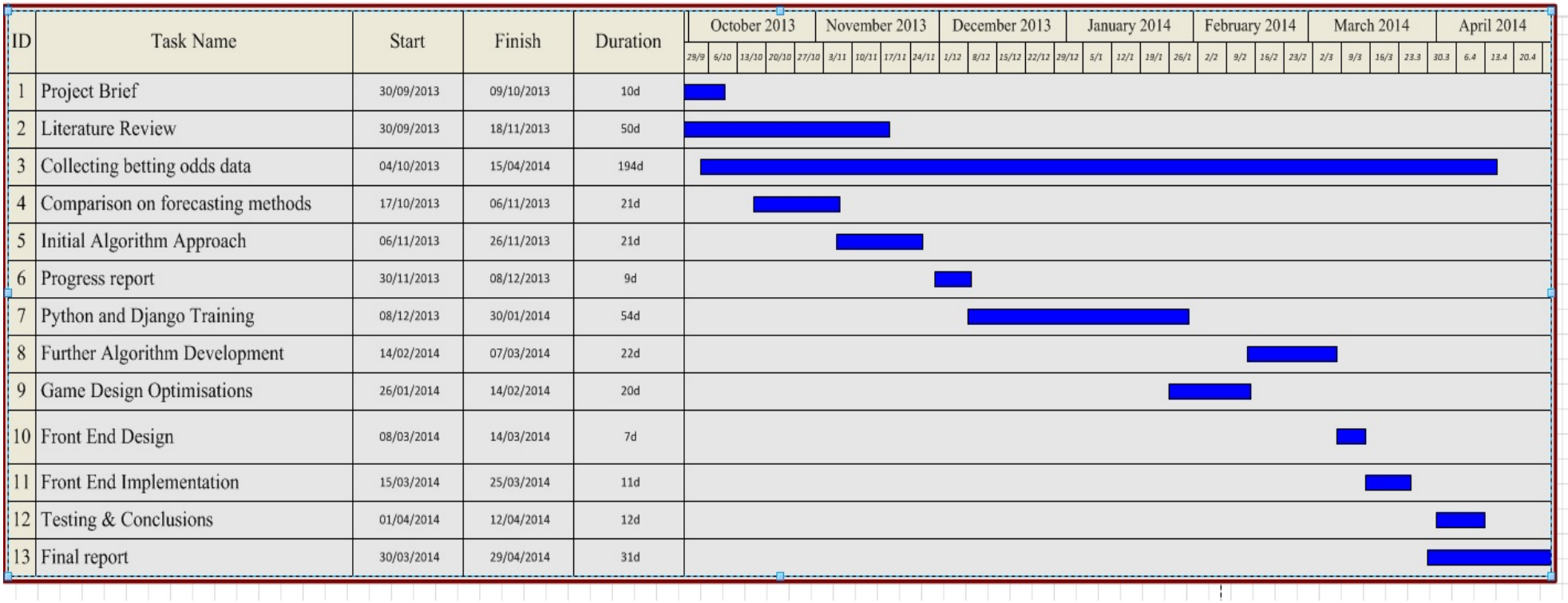
The back-end of the project will make use of artificial intelligence algorithms which will predict the most likely outcome of sport events based on a large set of statistical data. This data will be obtained from sports statistics websites and will include but not limited to: team squad, team form (last X games in the particular tournament/league), head-to-head results from previous seasons, home and away factor, motivation for the particular game (a must-win for one of the teams), key players missing, etc. Moreover, the intelligent agent, known as a "Tipster", will also make use of the bookmakers' odds instead of implementing the idea to try to "beat the bookies". The weight of each of these factors will be adjusted using different classification algorithms and statistical models.

The predictions of the "Tipster" will be fed into a front-end website. It is intended that the website is coded in PHP and it will make use of either a MySQL or MongoDB database but these decisions are not conclusive. Users will be able to register on the website and play against the "Tipster" as well as competing against each other in leagues or in head-to-head mode. The users will gain or lose points, where different rules will apply depending on the sport they have tried to predict. That is so because predicting the correct score is way more difficult in a sport such as basketball when compared to football, for example. Points will generally be gained for predicting the correct outcome (win or draw), correct goals/points difference and correct result whereas points will be lost for wrong predictions. There will be no need to create rounds with X games in each of them as there will be a risk of losing points when trying to predict more games than the other players. It is plausible that games will be available on a daily basis, depending on the number of the sports that will feature.

A survey will be created in the initial stages of the project so that useful information will be gathered on what sports and leagues are the people interested so that the popular ones will feature into the game. The draft plan is to have football, basketball, tennis, volleyball and ice hockey matches available.

B. Gantt Chart

ID	Task Name	Start	Finish	Duration
1	Project Brief	30/09/2013	09/10/2013	10d
2	Literature Review	30/09/2013	18/11/2013	50d
3	Collecting betting odds data	04/10/2013	15/04/2014	194d
4	Comparison on forecasting methods	17/10/2013	06/11/2013	21d
5	Initial Algorithm Approach	06/11/2013	26/11/2013	21d
6	Progress report	30/11/2013	08/12/2013	9d
7	Python and Django Training	08/12/2013	30/01/2014	54d
8	Further Algorithm Development	14/02/2014	07/03/2014	22d
9	Game Design Optimisations	26/01/2014	14/02/2014	20d
10	Front End Design	08/03/2014	14/03/2014	7d
11	Front End Implementation	15/03/2014	25/03/2014	11d
12	Testing & Conclusions	01/04/2014	12/04/2014	12d
13	Final report	30/03/2014	29/04/2014	31d



C. Scoring Table – Home Win Prediction

Predicted result / Actual Result	1:0	2:0	2:1	3:0	3:1	3:2	4:0	4:1	5:0
1:0	50	20	30	20	20	30	20	20	20
2:0	20	50	20	20	30	20	20	20	20
2:1	30	20	50	20	20	30	20	20	20
3:0	20	20	20	50	20	20	20	30	20
3:1	20	30	20	20	50	20	20	20	20
3:2	30	20	30	20	20	50	20	20	20
4:0	20	20	20	20	20	20	50	20	20
4:1	20	20	20	30	20	20	20	50	20
5:0	20	20	20	20	20	20	20	20	50
0:0	-15	-15	-15	-15	-15	-15	-15	-15	-15
1:1	-15	-15	-15	-15	-15	-15	-15	-15	-15
2:2	-15	-15	-15	-15	-15	-15	-15	-15	-15
3:3	-15	-15	-15	-15	-15	-15	-15	-15	-15
4:4	-15	-15	-15	-15	-15	-15	-15	-15	-15
0:1	-30	-30	-30	-30	-30	-30	-30	-30	-30
0:2	-30	-30	-30	-30	-30	-30	-30	-30	-30
1:2	-30	-30	-30	-30	-30	-30	-30	-30	-30
0:3	-30	-30	-30	-30	-30	-30	-30	-30	-30
1:3	-30	-30	-30	-30	-30	-30	-30	-30	-30
2:3	-30	-30	-30	-30	-30	-30	-30	-30	-30
0:4	-30	-30	-30	-30	-30	-30	-30	-30	-30
1:4	-30	-30	-30	-30	-30	-30	-30	-30	-30
0:5	-30	-30	-30	-30	-30	-30	-30	-30	-30

D. Scoring Table – Draw Prediction

Predicted result / Actual Result	0:0	1:1	2:2	3:3	4:4
1:0	-15	-15	-15	-15	-15
2:0	-15	-15	-15	-15	-15
2:1	-15	-15	-15	-15	-15
3:0	-15	-15	-15	-15	-15
3:1	-15	-15	-15	-15	-15
3:2	-15	-15	-15	-15	-15
4:0	-15	-15	-15	-15	-15
4:1	-15	-15	-15	-15	-15
5:0	-15	-15	-15	-15	-15
0:0	50	30	30	30	30
1:1	30	50	30	30	30
2:2	30	30	50	30	30
3:3	30	30	30	50	30
4:4	30	30	30	30	50
0:1	-15	-15	-15	-15	-15
0:2	-15	-15	-15	-15	-15
1:2	-15	-15	-15	-15	-15
0:3	-15	-15	-15	-15	-15
1:3	-15	-15	-15	-15	-15
2:3	-15	-15	-15	-15	-15
0:4	-15	-15	-15	-15	-15
1:4	-15	-15	-15	-15	-15
0:5	-15	-15	-15	-15	-15

E. Scoring Table – Away Win Prediction

Predicted result / Actual Result	0:1	0:2	1:2	0:3	1:3	2:3	0:4	1:4	0:5
1:0	-30	-30	-30	-30	-30	-30	-30	-30	-30
2:0	-30	-30	-30	-30	-30	-30	-30	-30	-30
2:1	-30	-30	-30	-30	-30	-30	-30	-30	-30
3:0	-30	-30	-30	-30	-30	-30	-30	-30	-30
3:1	-30	-30	-30	-30	-30	-30	-30	-30	-30
3:2	-30	-30	-30	-30	-30	-30	-30	-30	-30
4:0	-30	-30	-30	-30	-30	-30	-30	-30	-30
4:1	-30	-30	-30	-30	-30	-30	-30	-30	-30
5:0	-30	-30	-30	-30	-30	-30	-30	-30	-30
0:0	-15	-15	-15	-15	-15	-15	-15	-15	-15
1:1	-15	-15	-15	-15	-15	-15	-15	-15	-15
2:2	-15	-15	-15	-15	-15	-15	-15	-15	-15
3:3	-15	-15	-15	-15	-15	-15	-15	-15	-15
4:4	-15	-15	-15	-15	-15	-15	-15	-15	-15
0:1	50	20	30	20	20	30	20	20	20
0:2	20	50	20	20	30	20	20	20	20
1:2	30	20	50	20	20	30	20	20	20
0:3	20	20	20	50	20	20	20	30	20
1:3	20	30	20	20	50	20	20	20	20
2:3	30	20	30	20	20	50	20	20	20
0:4	20	20	20	20	20	20	50	20	20
1:4	20	20	20	30	20	20	20	50	20
0:5	20	20	20	20	20	20	20	20	50

F. ESBO Algorithm

```
from xlrd import open_workbook,XL_CELL_TEXT,cellname

book = open_workbook('Predictions - February 2014\Scoring
table.xlsx')
sheet = book.sheet_by_index(0)


def calculate_chance(odds1, odds2, odds3, odds4, odds5):
    odds1_chance = 1/odds1
    odds2_chance = 1/odds2
    odds3_chance = 1/odds3
    odds4_chance = 1/odds4
    odds5_chance = 1/odds5

    sum = odds1_chance + odds2_chance + odds3_chance + odds4_chance
+ odds5_chance

    coefficient = 100/sum

    odds1_chance_to100 = odds1_chance * coefficient
    odds2_chance_to100 = odds2_chance * coefficient
    odds3_chance_to100 = odds3_chance * coefficient
    odds4_chance_to100 = odds4_chance * coefficient
    odds5_chance_to100 = odds5_chance * coefficient

    print

    print("Odds #1 chance: %.2f" % odds1_chance_to100)
    print("Odds #2 chance: %.2f" % odds2_chance_to100)
    print("Odds #3 chance: %.2f" % odds3_chance_to100)
    print("Odds #4 chance: %.2f" % odds4_chance_to100)
    print("Odds #5 chance: %.2f" % odds5_chance_to100)

    return odds1_chance_to100, odds2_chance_to100,
odds3_chance_to100, odds4_chance_to100, odds5_chance_to100

odds1_chance_to100, odds2_chance_to100, odds3_chance_to100,
odds4_chance_to100, odds5_chance_to100 = calculate_chance(odds1,
odds2, odds3, odds4, odds5)

def calculate_estimated_score(result1, result2, result3, result4,
result5,
                              odds1_chance_to100,
odds2_chance_to100,
                              odds3_chance_to100,
odds4_chance_to100,
                              odds5_chance_to100):

    #*************** case 1: ******************
    predicted_score = result1
    #case 1.1:
    actual_score = result1
    sum_result1 =
float(odds1_chance_to100/100*find_cell(actual_score,
predicted_score))
```

```
    #print "%.2f" % sum_result1

    #case 1.2:
    actual_score = result2
    sum_result1 = sum_result1 +
float(odds2_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result1

    #case 1.3:
    actual_score = result3
    sum_result1 = sum_result1 +
float(odds3_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result1

    #case 1.4:
    actual_score = result4
    sum_result1 = sum_result1 +
float(odds4_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result1

    #case 1.5:
    actual_score = result5
    sum_result1 = sum_result1 +
float(odds5_chance_to100/100*find_cell(actual_score,
predicted_score))
    print "Esimated score for prediction " + predicted_score + ": "
+ "%.2f" % sum_result1
    #**************** end case 1 ******************

    #**************** case 2: ******************
    predicted_score = result2
    #case 2.1:
    actual_score = result1
    sum_result2 =
float(odds1_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result2

    #case 2.2:
    actual_score = result2
    sum_result2 = sum_result2 +
float(odds2_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result2

    #case 2.3:
    actual_score = result3
    sum_result2 = sum_result2 +
float(odds3_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result2

    #case 2.4:
    actual_score = result4
    sum_result2 = sum_result2 +
float(odds4_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result2
```

```
    #case 2.5:
    actual_score = result5
    sum_result2 = sum_result2 +
float(odds5_chance_to100/100*find_cell(actual_score,
predicted_score))
    print "Esimated score for prediction " + predicted_score + ": "
+ "%.2f" % sum_result2
    #**************** end case 2 ******************

    #**************** case 3: ******************
    predicted_score = result3
    #case 3.1:
    actual_score = result1
    sum_result3 =
float(odds1_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result3

    #case 3.2:
    actual_score = result2
    sum_result3 = sum_result3 +
float(odds2_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result3

    #case 3.3:
    actual_score = result3
    sum_result3 = sum_result3 +
float(odds3_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result3

    #case 3.4:
    actual_score = result4
    sum_result3 = sum_result3 +
float(odds4_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result3

    #case 3.5:
    actual_score = result5
    sum_result3 = sum_result3 +
float(odds5_chance_to100/100*find_cell(actual_score,
predicted_score))
    print "Esimated score for prediction " + predicted_score + ": "
+ "%.2f" % sum_result3
    #**************** end case 3 ******************

    #**************** case 4: ******************
    predicted_score = result4
    #case 4.1:
    actual_score = result1
    sum_result4 =
float(odds1_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result4

    #case 4.2:
    actual_score = result2
```

```
    sum_result4 = sum_result4 +
float(odds2_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result4

    #case 4.3:
    actual_score = result3
    sum_result4 = sum_result4 +
float(odds3_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result4

    #case 4.4:
    actual_score = result4
    sum_result4 = sum_result4 +
float(odds4_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result4

    #case 4.5:
    actual_score = result5
    sum_result4 = sum_result4 +
float(odds5_chance_to100/100*find_cell(actual_score,
predicted_score))
    print "Esimated score for prediction " + predicted_score + ": "
+ "%.2f" % sum_result4
    #**************** end case 4 ******************

    #**************** case 5: ******************
    predicted_score = result5
    #case 5.1:
    actual_score = result1
    sum_result5 =
float(odds1_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result5

    #case 5.2:
    actual_score = result2
    sum_result5 = sum_result5 +
float(odds2_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result5

    #case 5.3:
    actual_score = result3
    sum_result5 = sum_result5 +
float(odds3_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result5

    #case 5.4:
    actual_score = result4
    sum_result5 = sum_result5 +
float(odds4_chance_to100/100*find_cell(actual_score,
predicted_score))
    #print "%.2f" % sum_result5

    #case 5.5:
    actual_score = result5
```

```
    sum_result5 = sum_result5 +
float(odds5_chance_to100/100*find_cell(actual_score,
predicted_score))
    print "Esimated score for prediction " + predicted_score + ": "
+ "%.2f" % sum_result5
    #**************** end case 5 ******************



def find_cell(score1, score2):
    for y in range(0, sheet.ncols):
        for x in range(0,sheet.nrows):
            if sheet.cell_value(x,0) == score2 and
sheet.cell_value(0,y) == score1:
                #print sheet.cell_value(x,y)
                #print cellname(x,y)
                cell_value = sheet.cell_value(x,y)
                return cell_value

#calculate_chance(odds1, odds2, odds3, odds4, odds5)
calculate_estimated_score(result1, result2, result3, result4,
result5, odds1_chance_to100, odds2_chance_to100,
odds3_chance_to100, odds4_chance_to100, odds5_chance_to100)
```

G. Borislav Borisov’s Predictions

Home Team	Actual Result	Away Team	Predicted Result	ESBO Result	Matchday	Score/PPG
Matchday 1						
Swansea	1 - 4	Man Utd	2:1	-30		
Arsenal	1 - 3	Aston Villa	1:0	-30		
Norwich	2 - 2	Everton	2:1	-15		
Sunderland	0 - 1	Fulham	2:1	-30		
West Brom	0 - 1	Southampton	1:1	-15		
West Ham	2 - 0	Cardiff	0:0	-15		
Liverpool	1 - 0	Stoke	2:0	20		
Man City	4 - 0	Newcastle	3:1	20		
Chelsea	2 - 0	Hull	3:0	20		
Crystal Palace	0 - 1	Spurs	0:2	20		
Chelsea	2 - 1	Aston Villa	1:1	-15		
					Matchday 1	-70
Matchday 2					PPG:	-6.36
Man Utd	0 - 0	Chelsea	2:1	-15		
Cardiff	3 - 2	Man City	1:2	-30		
Spurs	1 - 0	Swansea	1:1	-15		
Aston Villa	0 - 1	Liverpool	2:2	-15		
Everton	0 - 0	West Brom	1:2	-15		
Hull	1 - 0	Norwich	2:1	30		
Newcastle	0 - 0	West Ham	1:1	30		
Southampton	1 - 1	Sunderland	2:0	-15		
Stoke	2 - 1	Crystal Palace	2:1	50		
Fulham	1 - 3	Arsenal	1:1	-15		
					Matchday 2	-10
Matchday 3					PPG:	-1.00
Arsenal	1 - 0	Spurs	2:2	-15		
Liverpool	1 - 0	Man Utd	1:1	-15		
West Brom	0 - 2	Swansea	1:1	-15		
Crystal Palace	3 - 1	Sunderland	2:0	30		
Cardiff	0 - 0	Everton	2:1	-15		
Newcastle	1 - 0	Fulham	1:1	-15		
Norwich	1 - 0	Southampton	1:3	-30		
West Ham	0 - 1	Stoke	1:2	30		
Man City	2 - 0	Hull	2:0	50		
					Matchday 3	5
Matchday 4					PPG:	0.56
Swansea	2 - 2	Liverpool	no predictions			
Southampton	0 - 0	West Ham				
Everton	1 - 0	Chelsea				
Aston Villa	1 - 2	Newcastle				

Fulham	1 - 1	West Brom				
Hull	1 - 1	Cardiff				
Stoke	0 - 0	Man City				
Sunderland	1 - 3	Arsenal				
Spurs	2 - 0	Norwich				
Man Utd	2 - 0	Crystal Palace				
Matchday 5						
Cardiff	0 - 1	Spurs	no predictions			
Man City	4 - 1	Man Utd				
Arsenal	3 - 1	Stoke				
Crystal Palace	0 - 2	Swansea				
Chelsea	2 - 0	Fulham				
Liverpool	0 - 1	Southampton				
Newcastle	2 - 3	Hull				
West Brom	3 - 0	Sunderland				
West Ham	2 - 3	Everton				
Norwich	0 - 1	Aston Villa				
Matchday 6						
Everton	3 - 2	Newcastle	2:0	20		
Sunderland	1 - 3	Liverpool	0:0	-15		
Stoke	0 - 1	Norwich	2:1	-30		
Swansea	1 - 2	Arsenal	1:1	-15		
Aston Villa	3 - 2	Man City	0:2	-30		
Fulham	1 - 2	Cardiff	1:2	50		
Hull	1 - 0	West Ham	3:1	20		
Man Utd	1 - 2	West Brom	2:0	-30		
Southampton	2 - 0	Crystal Palace	3:1	30		
Spurs	1 - 1	Chelsea	1:1	50		
					Matchday 6	50
Matchday 7					PPG:	5.00
Spurs	0 - 3	West Ham	1:0	-30		
West Brom	1 - 1	Arsenal	2:1	-15		
Norwich	1 - 3	Chelsea	0:2	30		
Southampton	2 - 0	Swansea	1:1	-15		
Sunderland	1 - 2	Man Utd	1:1	-15		
Cardiff	1 - 2	Newcastle	1:0	-30		
Fulham	1 - 0	Stoke	1:2	-30		
Hull	0 - 0	Aston Villa	3:1	-15		
Liverpool	3 - 1	Crystal Palace	4:0	20		
Man City	3 - 1	Everton	3:1	50		

					Matchday 7	-50
Matchday 8					PPG:	-5.00
Crystal Palace	1 - 4	Fulham	2:1	-30		
Aston Villa	0 - 2	Spurs	1:1	-15		
West Ham	1 - 3	Man City	1:2	20		
Arsenal	4 - 1	Norwich	1:0	20		
Chelsea	4 - 1	Cardiff	2:0	20		
Everton	2 - 1	Hull	3:1	20		
Man Utd	1 - 1	Southampton	1:1	50		
Stoke	0 - 0	West Brom	1:2	-15		
Swansea	4 - 0	Sunderland	2:0	20		
Newcastle	2 - 2	Liverpool	1:1	30		
					Matchday 8	120
Matchday 9					PPG:	12.00
Chelsea	2 - 1	Man City	1:1	-15		
Swansea	0 - 0	West Ham	2:0	-15		
Spurs	1 - 0	Hull	3:1	20		
Sunderland	2 - 1	Newcastle	1:1	-15		
Southampton	2 - 0	Fulham	2:0	50		
Aston Villa	0 - 2	Everton	1:2	20		
Liverpool	4 - 1	West Brom	1:0	20		
Man Utd	3 - 2	Stoke	2:0	20		
Norwich	0 - 0	Cardiff	2:1	-15		
Crystal Palace	0 - 2	Arsenal	0:2	50		
					Matchday 9	120
Matchday 10					PPG:	12.00
Cardiff	1 - 0	Swansea	1:0	50		
Everton	0 - 0	Spurs	1:2	-15		
Arsenal	2 - 0	Liverpool	3:2	20		
Fulham	1 - 3	Man Utd	0:2	30		
Hull	1 - 0	Sunderland	1:0	50		
Man City	7 - 0	Norwich	4:0	20		
Stoke	1 - 1	Southampton	1:1	50		
West Brom	2 - 0	Crystal Palace	2:0	50		
West Ham	0 - 0	Aston Villa	1:1	30		
Newcastle	2 - 0	Chelsea	1:2	-30		
					Matchday 10	255
Matchday 11					PPG:	25.50
Man Utd	1 - 0	Arsenal	1:1	-15		
Swansea	3 - 3	Stoke	2:1	-15		
Sunderland	1 - 0	Man City	0:2	-30		
Spurs	0 - 1	Newcastle	1:1	-15		
Norwich	3 - 1	West Ham	1:1	-15		

Aston Villa	2 - 0	Cardiff	3:1	30		
Chelsea	2 - 2	West Brom	2:1	-15		
Crystal Palace	0 - 0	Everton	1:3	-15		
Liverpool	4 - 0	Fulham	4:0	50		
Southampton	4 - 1	Hull	2:0	20		
					Matchday 11	-20
Matchday 12					PPG:	-2.00
West Brom	2 - 2	Aston Villa	1:2	-15		
Cardiff	2 - 2	Man Utd	1:1	30		
Man City	6 - 0	Spurs	2:0	20		
West Ham	0 - 3	Chelsea	1:2	20		
Arsenal	2 - 0	Southampton	1:0	20		
Fulham	1 - 2	Swansea	1:1	-15		
Hull	0 - 1	Crystal Palace	2:0	-30		
Newcastle	2 - 1	Norwich	3:1	20		
Stoke	2 - 0	Sunderland	1:1	-15		
Everton	3 - 3	Liverpool	1:2	-15		
					Matchday 12	20
Matchday 13					PPG:	2.00
Chelsea	3 - 1	Southampton	1:1	-15		
Man City	3 - 0	Swansea	4:0	20		
Hull	3 - 1	Liverpool	1:3	-30		
Spurs	2 - 2	Man Utd	1:0	-15		
Newcastle	2 - 1	West Brom	0:2	-30		
Aston Villa	0 - 0	Sunderland	2:1	-15		
Cardiff	0 - 3	Arsenal	1:1	-15		
Everton	4 - 0	Stoke	3:1	20		
Norwich	1 - 0	Crystal Palace	1:1	-15		
West Ham	3 - 0	Fulham	2:1	20		
					Matchday 13	-75
Matchday 14					PPG:	-7.50
Fulham	1 - 2	Spurs	no predictions			
West Brom	2 - 3	Man City				
Arsenal	2 - 0	Hull				
Liverpool	5 - 1	Norwich				
Man Utd	0 - 1	Everton				
Southampton	2 - 3	Aston Villa				
Stoke	0 - 0	Cardiff				
Sunderland	3 - 4	Chelsea				
Swansea	3 - 0	Newcastle				
Crystal Palace	1 - 0	West Ham				

Matchday 15						
Swansea	1 - 1	Hull	1:1	50		
Arsenal	1 - 1	Everton	2:1	-15		
Fulham	2 - 0	Aston Villa	1:3	-30		
Sunderland	1 - 2	Spurs	2:1	-30		
Crystal Palace	2 - 0	Cardiff	2:1	20		
Liverpool	4 - 1	West Ham	3:0	30		
Southampton	1 - 1	Man City	1:3	-15		
Stoke	3 - 2	Chelsea	1:3	-30		
West Brom	0 - 2	Norwich	3:1	-30		
Man Utd	0 - 1	Newcastle	1:1	-15		
					Matchday 15	-65
Matchday 16					PPG:	-6.50
Spurs	0 - 5	Liverpool	1:1	-15		
Aston Villa	0 - 3	Man Utd	2:1	-30		
Norwich	1 - 1	Swansea	1:0	-15		
Hull	0 - 0	Stoke	2:1	-15		
Cardiff	1 - 0	West Brom	1:3	-30		
Chelsea	2 - 1	Crystal Palace	2:0	20		
Everton	4 - 1	Fulham	2:1	20		
Newcastle	1 - 1	Southampton	1:1	50		
West Ham	0 - 0	Sunderland	1:2	-15		
Man City	6 - 3	Arsenal	3:1	20		
					Matchday 16	-10
Matchday 17					PPG:	-1.00
Arsenal	0 - 0	Chelsea	2:1	-15		
Swansea	1 - 2	Everton	1:1	-15		
Southampton	2 - 3	Spurs	1:1	-15		
Crystal Palace	0 - 3	Newcastle	1:0	-30		
Fulham	2 - 4	Man City	1:1	-15		
Man Utd	3 - 1	West Ham	2:0	30		
Stoke	2 - 1	Aston Villa	1:2	-30		
Sunderland	0 - 0	Norwich	2:1	-15		
West Brom	1 - 1	Hull	1:2	-15		
Liverpool	3 - 1	Cardiff	4:0	20		
					Matchday 17	-100
Matchday 18					PPG:	-10.00
Man City	2 - 1	Liverpool	1:2	-30		
Aston Villa	0 - 1	Crystal Palace	1:1	-15		
Cardiff	0 - 3	Southampton	1:1	-15		

Chelsea	1 - 0	Swansea	3:1	20		
Everton	0 - 1	Sunderland	2:1	-30		
Newcastle	5 - 1	Stoke	2:0	20		
Norwich	1 - 2	Fulham	1:0	-30		
Spurs	1 - 1	West Brom	3:1	-15		
West Ham	1 - 3	Arsenal	1:1	-15		
Hull	2 - 3	Man Utd	1:1	-15		
					Matchday 18	-125
Matchday 19					PPG:	-12.50
Chelsea	2 - 1	Liverpool	1:1	-15		
Spurs	3 - 0	Stoke	2:1	20		
Everton	2 - 1	Southampton	2:0	20		
Newcastle	0 - 1	Arsenal	1:1	-15		
Cardiff	2 - 2	Sunderland	1:2	-15		
Aston Villa	1 - 1	Swansea	2:0	-15		
Hull	6 - 0	Fulham	2:1	20		
Man City	1 - 0	Crystal Palace	4:0	20		
Norwich	0 - 1	Man Utd	0:1	50		
West Ham	3 - 3	West Brom	1:2	-15		
					Matchday 19	55
Matchday 20					PPG:	5.50
Man Utd	1 - 2	Spurs	no predictions			
Arsenal	2 - 0	Cardiff				
Crystal Palace	1 - 1	Norwich				
Fulham	2 - 1	West Ham				
Liverpool	2 - 0	Hull				
Southampton	0 - 3	Chelsea				
Stoke	1 - 1	Everton				
Sunderland	0 - 1	Aston Villa				
West Brom	1 - 0	Newcastle				
Swansea	2 - 3	Man City				
Matchday 21						
Aston Villa	1 - 2	Arsenal	1:1	-15		
Stoke	3 - 5	Liverpool	0:2	30		
Newcastle	0 - 2	Man City	1:1	-15		
Man Utd	2 - 0	Swansea	3:0	20		
Cardiff	0 - 2	West Ham	2:0	-30		
Everton	2 - 0	Norwich	2:1	20		
Fulham	1 - 4	Sunderland	1:2	20		
Southampton	1 - 0	West Brom	2:0	20		
Spurs	2 - 0	Crystal Palace	2:1	20		

Hull	0 - 2	Chelsea	1:3	30		
					Matchday 21	100
Matchday 22					PPG:	10.00
West Brom	1 - 1	Everton	1:2	-15		
Chelsea	3 - 1	Man Utd	1:1	-15		
Swansea	1 - 3	Spurs	1:1	-15		
Liverpool	2 - 2	Aston Villa	2:1	-15		
Arsenal	2 - 0	Fulham	2:0	50		
Crystal Palace	1 - 0	Stoke	2:2	-15		
Man City	4 - 2	Cardiff	2:0	30		
Norwich	1 - 0	Hull	0:1	-30		
West Ham	1 - 3	Newcastle	1:3	50		
Sunderland	2 - 2	Southampton	2:1	-15		
					Matchday 22	10
Matchday 23					PPG:	1.00
Aston Villa	4 - 3	West Brom	2:1	30		
Chelsea	0 - 0	West Ham	2:0	-15		
Sunderland	1 - 0	Stoke	2:1	30		
Spurs	1 - 5	Man City	0:2	20		
Crystal Palace	1 - 0	Hull	0:0	-15		
Liverpool	4 - 0	Everton	1:2	-30		
Man Utd	2 - 0	Cardiff	2:0	50		
Norwich	0 - 0	Newcastle	1:1	30		
Southampton	2 - 2	Arsenal	2:2	50		
Swansea	2 - 0	Fulham	3:0	20		
					Matchday 23	170
Matchday 24					PPG:	17.00
Man City	0 - 1	Chelsea	no predictions			
Arsenal	2 - 0	Crystal Palace				
West Brom	1 - 1	Liverpool				
Cardiff	2 - 1	Norwich				
Everton	2 - 1	Aston Villa				
Fulham	0 - 3	Southampton				
Hull	1 - 1	Spurs				
Stoke	2 - 1	Man Utd				
Newcastle	0 - 3	Sunderland				
West Ham	2 - 0	Swansea				
Matchday 25						
Man Utd	2 - 2	Fulham	2:0	-15		
Spurs	1 - 0	Everton	1:2	-30		
Swansea	3 - 0	Cardiff	1:2	-30		

Aston Villa	0 - 2	West Ham	2:1	-30		
Chelsea	3 - 0	Newcastle	2:0	20		
Crystal Palace	3 - 1	West Brom	1:1	-15		
Norwich	0 - 0	Man City	1:4	-15		
Southampton	2 - 2	Stoke	2:0	-15		
Sunderland	0 - 2	Hull	1:1	-15		
Liverpool	5 - 1	Arsenal	3:1	20		
					Matchday 25	-125
Matchday 26					PPG:	-12.50
Fulham	2 - 3	Liverpool	no predictions			
Arsenal	0 - 0	Man Utd				
Newcastle	0 - 4	Spurs				
Stoke	1 - 1	Swansea				
West Brom	1 - 1	Chelsea				
Cardiff	0 - 0	Aston Villa				
Hull	0 - 1	Southampton				
West Ham	2 - 0	Norwich				
Matchday 27						
Norwich	1 - 0	Spurs	1:3	-30		
Liverpool	4 - 3	Swansea	4:0	20		
Newcastle	1 - 0	Aston Villa	1:2	-30		
Crystal Palace	0 - 2	Man Utd	2:1	-30		
Arsenal	4 - 1	Sunderland	2:0	20		
Cardiff	0 - 4	Hull	1:1	-15		
Man City	1 - 0	Stoke	3:0	20		
West Brom	1 - 1	Fulham	0:0	30		
West Ham	3 - 1	Southampton	0:2	-30		
Chelsea	1 - 0	Everton	3:1	20		
					Matchday 27	-25
Matchday 28					PPG:	-2.50
Aston Villa	4 - 1	Norwich	2:1	20		
Swansea	1 - 1	Crystal Palace	2:1	-15		
Spurs	1 - 0	Cardiff	4:0	20		
Southampton	0 - 3	Liverpool	2:3	20		
Everton	1 - 0	West Ham	3:1	20		
Fulham	1 - 3	Chelsea	1:1	-15		
Hull	1 - 4	Newcastle	2:1	-30		
Stoke	1 - 0	Arsenal	1:1	-15		
					Matchday 28	5
Matchday 29					PPG:	0.63
Chelsea	4 - 0	Spurs	2:1	20		

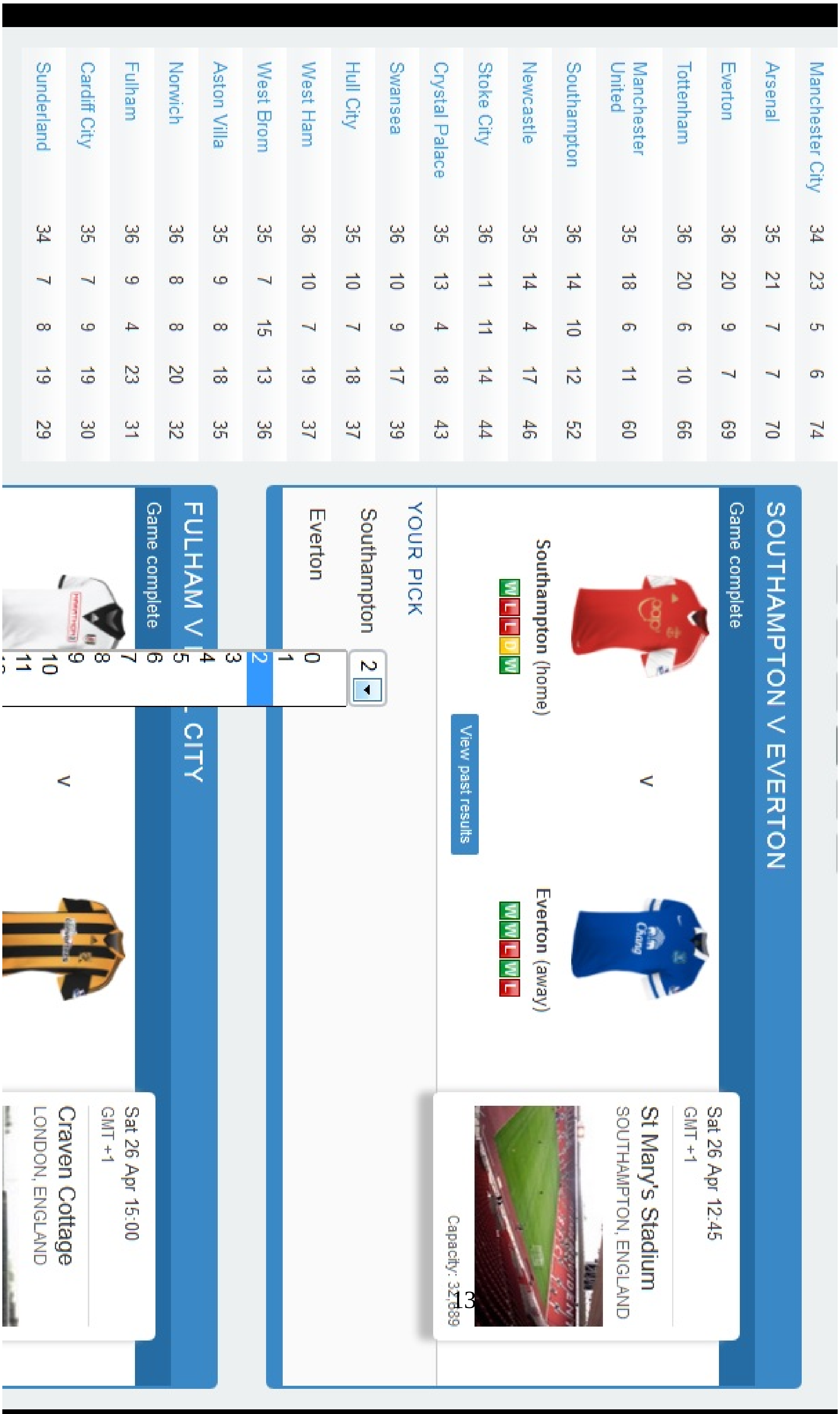
Cardiff	3 - 1	Fulham	1:1	-15		
Crystal Palace	0 - 1	Southampton	1:1	-15		
Norwich	1 - 1	Stoke	0:2	-15		
West Brom	0 - 3	Man Utd	1:1	-15		
					Matchday 29	-40
Matchday 30					PPG:	-8.00
Spurs	0 - 1	Arsenal	2:1	-30		
Manchester United	0 - 3	Liverpool	1:3	20		
Aston Villa	1 - 0	Chelsea	1:1	-15		
Everton	2 - 1	Cardiff	2:0	20		
Fulham	1 - 0	Newcastle	3:1	20		
Southampton	4 - 2	Norwich	2:1	20		
Stoke	3 - 1	West Ham	3:1	50		
Sunderland	0 - 0	Crystal Palace	2:2	30		
Swansea	1 - 2	West Brom	1:2	50		
Hull	0 - 2	Man City	1:1	-15		
					Matchday 30	150
Matchday 31					PPG:	15.00
Aston Villa	1 - 4	Stoke	1:1	-15		
Spurs	3 - 2	Southampton	1:3	-30		
West Ham	0 - 2	Man Utd	2:2	-15		
Cardiff	3 - 6	Liverpool	1:2	20		
Everton	3 - 2	Swansea	2:1	30		
Hull	2 - 0	West Brom	2:1	20		
Man City	5 - 0	Fulham	3:0	20		
Newcastle	1 - 0	Crystal Palace	0:0	-15		
Norwich	2 - 0	Sunderland	1:3	-30		
Chelsea	6 - 0	Arsenal	2:0	20		
Liverpool	2 - 1	Sunderland			**Matchday 31**	5
West Ham	2 - 1	Hull			PPG:	0.50
Arsenal	2 - 2	Swansea				
Man Utd	0 - 3	Man City				
Newcastle	0 - 3	Everton				
Matchday 32						
Sunderland	1 - 2	West Ham	2:0	-15		
Liverpool	4 - 0	Spurs	4:1	20		
Fulham	1 - 3	Everton	1:1	-15		
Arsenal	1 - 1	Man City	1:1	50		
Crystal Palace	1 - 0	Chelsea	0:3	-30		

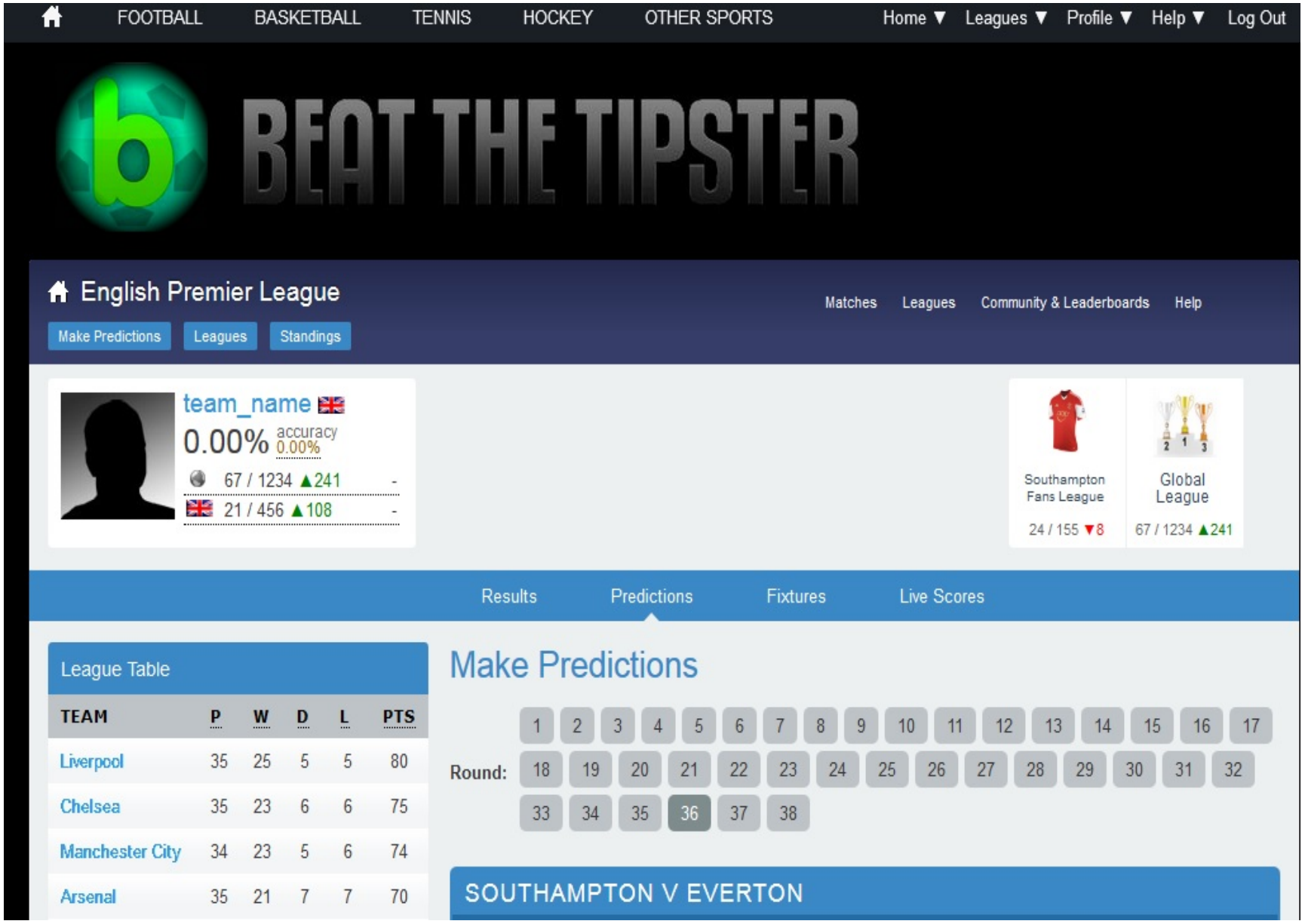
Southampton	4 - 0	Newcastle	3:1	20		
Stoke	1 - 0	Hull	1:1	-15		
Swansea	3 - 0	Norwich	2:1	20		
West Brom	3 - 3	Cardiff	1:2	-15		
Man Utd	4 - 1	Aston Villa	1:3	-30		
					Matchday 32	-10
Matchday 33					PPG:	-1.00
Spurs	5 - 1	Sunderland	3:1	20		
West Ham	1 - 2	Liverpool	1:3	20		
Everton	3 - 0	Arsenal	1:1	-15		
Chelsea	3 - 0	Stoke	2:0	20		
Aston Villa	1 - 2	Fulham	2:1	-30		
Cardiff	0 - 3	Crystal Palace	1:1	-15		
Hull	1 - 0	Swansea	2:1	30		
Newcastle	0 - 4	Man Utd	0:2	20		
Norwich	0 - 1	West Brom	1:2	30		
Man City	4 - 1	Southampton	1:1	-15		
					Matchday 33	65
					PPG:	6.50

H. Mark Lawrenson's Predictions

Matchday	Correct scores	Correct home/away wins	Correct draws	-15	-30	Games
GW1	3	3	0	3	2	11
GW2	0	3	1	5	1	10
GW3	0	5	1	1	2	9
GW4	2	2	2	3	1	10
GW5	1	3	0	2	4	10
GW6	2	2	0	2	4	10
GW7	2	6	1	0	1	10
GW8	0	5	1	4	0	10
GW9	1	3	0	5	1	10
GW10	1	2	1	4	2	10
GW11	1	3	0	4	2	10
GW12	3	1	2	2	2	10
GW13	1	5	0	3	1	10
GW14	2	3	0	2	3	10
GW15	2	3	0	3	2	10
GW16	0	4	1	4	1	10
GW17	0	4	0	4	2	10
GW18	0	5	0	3	2	10
GW19	0	5	1	4	0	10
GW20	3	4	0	1	2	10
GW21	5	1	0	2	2	10
GW22	1	5	1	2	1	10
GW23	2	4	2	2	0	10
GW24	1	2	0	4	3	10
GW25	0	5	0	3	2	10
GW26	0	1	2	3	2	8
GW27	1	4	0	4	1	10
GW28	0	4	0	3	1	8
GW29	1	2	0	1	1	5
GW30	1	4	0	3	2	10
GW31	1	5	0	2	2	10
GW32	0	6	0	2	2	10
GW33	1	5	0	2	2	10
GW34	0	4	1	4	1	10
GW35	1	4	1	2	2	10
						1
Total	39	127	18	98	59	342

I. Mockup Design




FOOTBALL
BASKETBALL
TENNIS
HOCKEY
OTHER SPORTS
Home ▼
Leagues ▼
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BEAT THE TIPSTER
English Premier League
Make Predictions
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Standings
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Help
team_name
0.00% accuracy 0.00%
67 / 1234 ▲241 -
21 / 456 ▲108 -
Southampton Fans League
24 / 155 ▼8
Global League
67 / 1234 ▲241
Results
Predictions
Fixtures
Live Scores
League Table
TEAM P W D L PTS
Liverpool 35 25 5 5 80
Chelsea 35 23 6 6 75
Manchester City 34 23 5 6 74
Arsenal 35 21 7 7 70
Make Predictions
Round: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38
SOUTHAMPTON V EVERTON