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Prediction Model of Success and Failure in Football Competitions

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The purpose of this study was to identify the factors which determine the winning and losing of football match. The sample used corresponded to 280 games from the 2019-2020 to 2020-21 season of the Hero Indian Super league (ISL) footballtournament. The game related statistics gathered were: total number of passes, successful passes, shot on target, fouls, crosses, red card, offside, shot off target, touches, intercepts, corners and yellow cards. The data were analyzed using Binary Logistic Regression (Forward: LR Method) with the result of the game as the dependent variable and predictor variables as covariates. β, standard error β, Wald's χ2, odds ratio with 95% confidence interval were calculated.Model evaluation was conducted using the likelihood ratio test, Cox & Snell (R2), and Nagelkerke (R2) tests. The goodness of fit test for the models was conducted using the Hosmer &Lemeshow test. The analysis revealed five factors were related to winning in football competition. The study shows that there is a significant association of important factors with respect to winning a match in a professional football championship. The coaches and players can take note of the important factors responsible for winning in the football championship.

Keywords: Prediction, Football, Logistic Regression, winning and Loosing

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Introduction

Performance analysis is now firmly established as an essential component of the coaching process, and the volume of performance analysis research has increased significantly (Mackenzie & Cushion, 2013). The application of video and computer technology in sport and the implementation of video review sessions into weekly training programmes (M. Guadagnoli, Holcomb, & Davis, 2010) has led to the belief that performance analysis ‘‘is now widely accepted among coaches, athletes, and sport scientists as a valuable input into the feedback process’’ (Drust, 2010). Now a day’s notational analysis capturing more attention of researchers,this technique is used in high-level competition such as world-class competition (Gawin et al., 2015).The primary focus of notational analysis is movement, technical and tactical appraisal, and statistical compilation. It is a methodology for analysing many aspects of performance through a procedure that entails creating a permanent record of occurrences using codes to represent specific events, allowing for some type of analysis. This analysis usually results in a statistical description of what happened during one event or a series of events, with the complexity of the analysis and the content of the coding open to choice. Given that one of the main tasks for a coach is also to analyse sports performance, so that feedback may be given to players and future training sessions planned, it seems likely that notational analysis would be a useful technique for coaches. Several studies have been conducted on the notational analysis in football (James, 2006; Pollard, 2010; Mouraa, Martinsb, & Cunha, 2013; Wright, Atkins, & Jones, 2012)

Football, also known as soccer, is the most popular sport on the planet. Many football teams compete in regional and national competitions in many countries. And there are numerous football championships across the world.Many viewers and analysts always make predictions, who will win the match before it begins. Therefore Football match result prediction has gained lots of popularity in recent years. Knowledge discovery in databases (KDD) was previously used to build a football match result predictive model by collecting factors that influence the outcome of football matches.Data mining techniques have also been used in the past. In current systems they focused on two methods I.e. statistical and machine learning for predicting football match results(Zaveri, Shah, Tiwari, Shinde, & Teli, 2018). Prediction is done by calculating a number of variables, such as home advantage, recent team performance, team strength (Baio & Blangiardo, 2010).Goals scored, total shots, shots on target, shots off target, ball possession, off-sides, fouls, corners, yellow cards and red cards (Castellano, Casamichana, & Lago, 2012).Managers and club directors may use prediction to determine what is required to win matches. It is important tofind performance indicators, which are described as a selection and combination of factors that describe specific aspects of performance and assist in achieving success and failure(M & R., 2002).As coaches are prone to making subjective judgments and may be unable to recall events reliably, they are increasingly turning to match analysis as a way of optimizing the training process of their players and teams (Franks & Hughes, 2004). (Singh Mandeep; Evaluation And Improvement Of Sports Techniques Through Biomechanical Updated Analyzing Technology; University News, Journal of Higher Education Association of Indian Universities; Vol.48 No.05, Feb 01-07, 2010,pp.54-57), (Singh Mandeep; Analysis Of Set Shot In Basketball In Relation With The Time To Perform The Course And Displacement Of Center Of Gravity; American Journal of Sports Science-USA; Vol.2 No.5.)

The fundamental goal of match analysis is to discover one's own team's strengths and shortcomings so that the present can be improved and the latter can be addressed. Similarly, a coach analysing a rival team's performance will utilize the data to find ways to offset their strengths while exploiting their flaws(C, J, Nelsen L, & Reilly, 2008).Although numerous studies have been done in prediction model in different sports i.e., beach volleyball(Kumar, Shukla, Chhoker, & Thapa, 2021), ice hockey(Wei Gu & Whitaker, 2016), tennis (Somboonphokkaphan & Phimoltares, 2009), badminton(Sharma, Monika, Kumar, & Kumar, 2020) football (Bailey, 2005; Baio & Blangiardo, 2010; Min, Kim, Choe, Eom, & McKay, 2008)The development of a predictive model for football matches is not only of academic interest, but also has substantial economic implications.According to a BBC report, the football betting market is worth between $700 billion to $1 trillion(Rahul Baboota, 2018),huge amount of money involved in football,

Which is growing by the year. On 2012/2013 season, total money spent by Premier League Clubs was approximately 918.7 million poundsterling, and it kept growing until 2015/2016, which was more than 1 billion poundsterling(Darwin Prasetio & Harlili, 2016).Our paper focuses specifically on the Indian Super League (ISL) is a professional football league which is one of two co-existing highest level in Indian football system along with the I-League. It is organized by the All India Football Federation and their commercial partners Football Sports Development.The league currently comprises 11 clubs(Indian Super League).

Related Review

In 2005 a study was conducted on Australian Football League, using match records from season 1997 until 2003 and made a multiple linear regression model. The author used home advantage, travel fatigue measured from distance traveled by the away team, ground familiarization, and measures of team quality and current form. He built 3 models, benchmark, team measures, and individual measures. His work produced 66.7% accuracy and he stated significant variables are team's attack strength, home advantage, traveled distance, and ground familiarization(Bailey, 2005).Bayesian hierarchical model to address both these aims and test its predictive strength on data about the Italian Series A championship 1991-1992. Author chose the variables home advantage, team attack, and team defense. His work produced each team's effect of attack and defense, and shown that the team with the biggest attack won the league at the end of the season(Baio & Blangiardo, 2010). Similar type of study was found, researcher using not only the score or results data, but also work rate, aggressiveness, and others. However, the author reached the similar conclusion, that the significant variables are attack and defense. Another variable were ball possession and traveled distance(Min, Kim, Choe, Eom, & McKay, 2008).In 2014 a prediction model created by a group of researchers. They employed ANN and logistic regression in their research and produced very high prediction accuracy with logistic regression, 95%. He used 9 sets of features from home and away data, which is goals, shorts, corner, odds, attack strength, players' performance index, managers' performance index, managers' win,

And teams' win streak. He built his model and tested it using English Premier League season 2014-2015 matches records(Igiri & Nwachukwu, 2014).According to Reddy et.al logistic regression in one of the methods he used to predict English Premier League season 2012-2013 matches. They reported that the significant variables were number of away goals scored, number of red cards, home team position, and shots on target(Reddy & Movva, 2014).In the year 2014 of Jongho and Robert wereattempting to predict soccer match outcomes using only "Virtual Data" (Video game data).The variable includes both physical(speed, power, acceleration, etc) and technical skills (dribbling, heading, accuracy, etc). VirtualPredictor, which uses only data collected from video games, achieved 0.80 hit rates. And they concluded that the data collected bythe video-game industry can be used to solve real soccer, with comparable or even better results(Shin & Gasparyan, 2014).Snyder conducted a research to predict Barclays' Premier League season 2011/2012 matches by using all matches in season 2010/2011. He used a lot of variables, stadium capacity, distance traveled by a team before match, and statistics of a team on previous season, including ranking, amount of wins, draws, losses, scored and conceded goals, goals difference in each match, points, money spent on players' wages, money spent on 2011 summer transfer market, and number of games a manager of the team has played in the league. He built his model with logistic regression and its prediction accuracy was 51.06% (Snyder, Jeffrey 2013), (Singh Mandeep; A Study Of Aggression Among Adolloscent National Players In Relation To Sex, Famly And Ordinal Position; Journal of Sports, Physical Education Allied and Alternative Sciences; Vol.01 No.01 July2010,pp 50-55)

Our research work is novel and unique in two ways. Because this paper considers many factors, I .e., total number of passes, successful passes, shot on target, fouls, crosses, red card, offside, shot off target, touches, intercepts, corners and yellow cards etc., while most previous works considered only one factor, usually score, or few factors. Secondly most of the studies conducted on European football league and FIFA world cup, but there is no study on the Asian football tournaments.

Method

To identify the factors which determine the winning

Of football game the matches played during the Hero Indian Super league (ISL)footballtournament of 2019-20 and 2020-21 seasons were considered in this study. The study variables selected for analyses were thetotal number of passes, successful passes, shot on target, fouls, crosses, red card, offside, shot off target, touches, intercepts, corners and yellow cards etc.,

Subjects

The study sample consisted of a total of 280 matches from 4 season of Hero Indian Super League from 2017-18 to 2020-21, held In India every year. The data for the present study was extracted from the official website of Hero Indian Super league (FIXTURES & RESULTS)

Statistical Analysis

All the statistical analyses were performed with IBM SPSS (version 26.0.0).Previously, a multi-collinearity diagnostic to find inter-correlations between predictive variables was performed. Once the data included in the model were reconsidered by avoiding the use of highly inter-correlated variables, the analysis of the different variables was performed using a logistic regression technique.

The dependent variable used in this paper's logistic regression model is Y ∈ {0, 1}, with 0 indicating a loss and 1 indicating win.

The data were analyzed using Binary Logistic Regression (Forward: LR Method) with the result of the game as the dependent variable and predictor variables as covariates. β, standard error β, Wald's χ2 , odds ratio with 95% confidence interval were calculated. Model evaluation was conducted using the likelihood ratio test, Cox & Snell (R2), and Nagelkerke (R2) tests. The goodness of fit test for the models was conducted using the Hosmer &Lemeshow test. In addition, observed and predicted frequencies by the regression model were also calculated with a cut-off of 0.50. The statistical level of significance was set at $p \leq 0.05$.

Table 1. Case Processing Summary

Unweighted Casesa		N	Percent
Selected Cases	Included in Analysis	560	100.0
	Missing Cases	0	.0
	Total	560	100.0
Unselected Cases		0	.0
Total		560	100.0

a. If weight is in effect, see classification table for the total number of cases.

Table 1shows the number of cases (N) in each category (e.g., included in the analysis, missing, and total) and their percentage. In logistic regression, a list wise deletion of missing data is done by default in SPSS. Since there is no missing data, the number of missing cases is shown as 0.

Table2. Dependent Variable Encoding

Original Value	Internal Value
0	0
1	1

Table 2shows the coding of the dependent variable used in the data file, that is, 1 for win and 0 for lost in the match.

Table 3. Classification Tablea,b

			Predicted		
			DV		Percentage
			0	1	Correct
Step 0	DV	0	0	280	.0
		1	0	280	100.0
	Overall Percentage				50.0

a. Constant is included in the model.

b. The cut value is .500

The **Table 3** shows that if nothing is known about the independent variables and one simple guesses that a team will win the match, we would be correct 50.0% of the time.

Table 4. Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	.000	.085	.000	1	1.000	1.000

Table 4 shows that the Wald statistics is not significant as its significance value is 0.085 which is more than 0.05. Hence, the model with constant is not worth and is equivalent to just guessing about the target variable in the absence of any knowledge about the independent variables.

Table 5. Variables not in the Equation

			Score	df	Sig.
Step 0	Variables	Correct_passes	.014	1	.906

Number_passes	1.222	1	.269	
Shot_on_target	59.960	1	.000	
Foul	3.670	1	.055	
crosses	30.041	1	.000	
red_card	7.523	1	.006	
offside	.915	1	.339	
Shot_of_target	1.341	1	.247	
touches	.133	1	.715	
intercepts	4.440	1	.035	
corners	8.373	1	.004	
yellow_card	1.081	1	.298	
Overall Statistics		146.800	12	.000

Table 5shows whether each independent variable improves the model or not. You can see that the variables shot on target, crosses, red card, intercepts and corners may improve the model as they are significant with short on target and crosses slightly better than red card, intercepts and corners. Inclusion of these variables would add to the predictive power of the model. If these variables had not been significant and able to contribute to the prediction, then the analysis would obviously be terminated at this stage.

Table 6. Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	712.137a	.108	.144
2	665.826a	.179	.239
3	654.571a	.195	.261
4	648.349a	.204	.272
5	643.689a	.211	.281

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Table 6 shows the value of -2 log likelihood (-2LL), which is a deviance statistic between the observed and predicated values of the dependent variable. As this deviance statistic is insignificant, it indicates that the model is good and there is no difference between observed and predicted values of dependent variable.

Table 7. Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	8.449	6	.207
2	11.163	8	.193
3	2.018	8	.980
4	4.848	8	.774
5	9.745	8	.283

In order to find whether the deviance statistic -2 log likelihood is insignificant or not, Hosmerand Lemeshow suggested the chi-square statistic which is shown in **Table 7**. In order that themodel is efficient, this chi-square statistic should be insignificant. Since the p value associated with chi-square in Table 8 is .327 for the fourth model, which is greater than .05, it isinsignificant and it can be interpreted that the model is efficient.

Table 8. Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1a	Shot_on_target	.298	.041	53.249	1	.000	1.348
	Constant	-1.348	.202	44.579	1	.000	.260
Step 2b	Shot_on_target	.354	.045	63.029	1	.000	1.425
	crosses	-.120	.019	40.925	1	.000	.887
	Constant	-.148	.272	.297	1	.586	.862
Step 3c	Shot_on_target	.359	.045	64.261	1	.000	1.432
	crosses	-.125	.019	43.261	1	.000	.882
	red_card	-1.137	.353	10.386	1	.001	.321
	Constant	-.003	.277	.000	1	.991	.997
Step 4d	Shot_on_target	.378	.046	67.338	1	.000	1.460
	crosses	-.111	.020	31.821	1	.000	.895
	red_card	-1.125	.357	9.917	1	.002	.325
	corners	-.099	.040	6.101	1	.014	.906
	Constant	.231	.293	.618	1	.432	1.260
Step 5e	Shot_on_target	.382	.046	68.085	1	.000	1.465
	Foul	.045	.022	4.247	1	.039	1.046
	crosses	-.111	.020	31.561	1	.000	.895
	red_card	-1.143	.360	10.074	1	.002	.319
	corners	-.093	.040	5.317	1	.021	.911
	Constant	-.423	.431	.962	1	.327	.655

a. Variable(s) entered on step 1: Shot_on_target.
b. Variable(s) entered on step 2: crosses.
c. Variable(s) entered on step 3: red_card.
d. Variable(s) entered on step 4: corners.
e. Variable(s) entered on step 5: Foul.

Table 8 shows the value of regression coefficients B, Wald statistics, its significance, and odds ratio exp(B) for each variable in all the four models. Significance of the Wald statistics indicates that the variable significantly predicts the success in winning of the match.

Discussion

The purpose of this study was to identify important factors that were significantly responsible for winning in the football match using a logistic regression approach.The results of the present study indicating few factors to be significantly responsible for winning in football competition, such as shot on target, crosses, red card, corners and fouls.

The short on target was found to be an important factor in determining success in football competition. Winning teams made more shots and shots on goal than losing. A previous similar study conducted on football supports our findings(Chakraborty, 2014)(Reddy & Movva, 2014) (Lago-Peñas, Lago-Ballesteros, Dellal, & Gómez, 2010)(Mao, Peng, Liu, & Gómez, 2016).A study conducted on 2002 World Cup, showed similar results and concluded that finalist teams made more shots than unsuccessful teams(Szwarc, 2004). According to an article percentage of winning a football match largely depend on the short on target (Subnation, 2021).

The crosses offensive tactic is one of the effective ways of attack. According to Horoshi Yamada crossing to the prime target area is an effective way to score. Accurate crossing to the target player in the front almost free from defense is an effective way of increasing the probability to score goal (Yamada & Hayashi, 2015). And according to our findings crosses are the important factor in winning the football match.

A study was conducted on 18/19 Premier League season it was observed that when a team received a red card on average 59% of the time a team lost matches, only 23% were won and 18% of games were drawn(Innerdrive, 2021). So it is clear

That the red card is an important factor for winning and losing a football match, and our analysis also support that red card has significant impact on competition. Reddy alsopredictnumber of red cards has significant effect on match result(Reddy & Movva, 2014).

Corner kick was found to be an important factor in determining success in football competition. According to research studies corner kicks are relatively uncommon and largely ineffective, but they are frequently a determining factor in the outcome of a match between two teams of a similar level, and this study concluded that elaborate corner kicks—sent to the far post, following a short initial kick and the intervention of three or four players in a dynamic set-up—are more effective. These circumstances have a 57.6% chance of score goal(Casal, Dios, Ardá, & Losada, 2015).

A foul is any action by a player that gives an unfair advantage to one team, endangers the well-being of an opponent, or is unsportsmanlike. A free-kick or penalty kick is issued to the team that was fouled and if the foul is considered severe than a yellow or red card may be issued. It is important to know that referees call fouls to protect players on the field and to preserve the integrity of the game. Our present study indicates that foul has a significant impact on winning and losing a competition.

Conclusion

This paper has presented values that can be used as normative data to design and evaluate practices and competitions for soccer peak performance teams in a collective way. Coaches can use this information to establish objectives for players and teams in practices and matches. These objectives can be oriented in a positive way (things or number of things to try to achieve) or in a negative way (things or number of things to try to avoid) with a special reference to the offensive or defensive play.

Reference

01. FIXTURES & RESULTS. (n. d.). *Retrieved April 12, 2021, from HERO INDIAN SUPER LEAGUE: [Article][Google Scholar]*

02. Laws of The Game. (2018-19). IFAB. *[Google Scholar]*

03. (2021, May 28). Retrieved

From skybet: https://support. skybet. com/s/article/Opta-Definitions. *[Google Scholar]*

04. (2021, may 28). Retrieved from Subnation: https://bitterandblue. sbnation. com/2013/1/11/3857360/analysis-shots-vs-shots-on-target. *[Google Scholar]*

05. (2021, May 28). Retrieved from Innerdrive: https://blog. innerdrive. co. *uk/sports/impact-of-red-cards-on-footballers [Google Scholar]*

06. Bailey, M. (2005). Predicting Sporting Outcomes: A Statistical Approach. *Swinburne University of Technology: Faculty of Life and Social Sciences. [Google Scholar]*

07. Baio, G. , & Blangiardo, M. (2010). Bayesian Hierarchical Model for The Prediction of Football Results. *Journal of Applied Statistics, 253-264 [Google Scholar]*

08. Baio, G. , & Blangiardo, M. A. (2010). *Bayesian hierarchical model for the prediction of. Journal of Applied Statistics,, 253-264 [Google Scholar]*

09. C, C. , J, B. , Nelsen L, & Reilly, T. (2008). *The role of motion analysis in elite soccer. Sports Med, 38, 839-862 [Google Scholar]*

10. Casal, C. A. , Dios, R. M. *, Ardá, T., & Losada, J. L. (2015). Analysis of Corner Kick Success in Elite Football. International Journal of Performance Analysis in Sport, 430-451 [Google Scholar]*

11. Castellano, J. , Casamichana, D. , & Lago, C. (2012). *The Use of Match Statistics that Discriminate Between Successful. Journal of Human Kinetics, 31, 139-147 [Google Scholar]*

12. Chakraborty, G. (2014). The Soccer Oracle: Predicting Soccer Game Outcomes Using SAS® Enterprise Miner™. SAS® GLOBAL FORUM. *Washington, D.C [Google Scholar]*

13. Christopher Carling, A. , Williams, M. , & Reilly, T. (2005). *Handbook of Soccer Match Analysis A Systematic Approach to Improving Performance. Abingdon, UK: Routledge [Google Scholar]*

14. Darwin Prasetio, & Harlili, D. (2016). Predicting Football Match Results with Logistic Regression. Predicting International Conference On Advanced Informatics: Concepts, Theory And Application (ICAICTA). *[Google Scholar]*

15. Drust, B. (2010). Performance Analysis research: Meeting the challenge. Journal of Sports Sciences, 921-922. *[Google Scholar]*

16. Franks, I. , & Hughes, M. (2004). Systems for Better Coaching and Performance in Sport. *London: Routledge [Google Scholar]*

17. Igiri, C. P. , & Nwachukwu, E. O. *(2014). An Improved Prediction System for Football a Match Result . IOSR Journal of Engineering, 4(12), 12-20 [Google Scholar]*

18. Indian Super League. (n. d.). *Retrieved April 10, 2021, from wikipedia: [Article][Google Scholar]*

19. James, N. (2006). The Role of Notational Analysis in Soccer. International Journal of Sports Science & Coaching, 185-198. *[Google Scholar]*

20. Kumar, G. , Shukla, A. , Chhoker, A. , & Thapa, R. *K. (2021). Identification Of Factors Determining Winning In Men's And Women's Beach Volleyball: A Logistical Regression Approach. Teorìâ ta Metodika Fìzičnogo Vihovannâ [Google Scholar]*

21. Lago-Peñas, C. , Lago-Ballesteros, J. , Dellal, A. , & Gómez, M. *(2010). Game-related statistics that discriminated winning, drawing and losing teams . Journal of Sports Science and Medicine, 288-293 [Google Scholar]*

22. M, H. , & R. , B. (2002). *The use of performance indicators in performance analysis. J Sport Sci,, 739-754 [Google Scholar]*

23. M. Guadagnoli, W. , Holcomb, & Davis, M. (2010). *The efficacy of video feedback for learning the golf swing. Journal of Sports Sciences, 615-622 [Google Scholar]*

24. Mackenzie, R. , & Cushion, C. (2013). Performance analysis in football: A critical review and implications for. *Journal of Sports Sciences, 31, 639–676 [Google Scholar]*

25. Mao, L. , Peng, Z. , Liu, H. , & Gómez, M. *-A. (2016). Identifying keys to win in the Chinese professional soccer league. International Journal of Performance Analysis in Sport, 935-947 [Google Scholar]*

26. Min, B. , Kim, J. , Choe, C. , Eom, H. *, & McKay, R. I. (2008). A Compound Framework for Sports Result Prediction: A Football Case Study. Journal of Knowledge-Based System, 7(21), 551-562 [Google Scholar]*

27. Mouraa, F. A. , Martinsb, L. E. *, & Cunha, S. A. (2013). Analysis of football game-related statistics using multivariate. Journal of Sports Sciences [Google Scholar]*

28. Pollard, R. (2010). Charles Reep (1904-2002): pioneer of. Journal of Sports Sciences, 853-855. *[Google Scholar]*

29. Rahul Baboota, H. K. (2018). Predictive analysis and modelling football results using machine learning approach for English Premier League. *International Journal of Forecasting [Google Scholar]*

30. Reddy, V. , & Movva, S. V. (2014). *The Soccer Oracle: Predicting Soccer Game Outcomes Using SAS® Enterprise Miner™. SAS® GLOBAL FORUM [Google Scholar]*

31. Sarkar, S. (2018). Paradox of crosses in association football (soccer). Journal of Quantitative Analysis in Sports, 25-36. *[Google Scholar]*

32. Sharma, M. , Monika, Kumar, N. , & Kumar, P. (2020). *Badminton match outcome prediction model using Naïve Bayes and Feature Weighting technique. Journal of Ambient Intelligence and Humanized Computing [Google Scholar]*

33. Shin, J. , & Gasparyan, R. (2014). A novel way to Soccer Match Prediction. *[Google Scholar]*

34. Somboonphokkaphan, A. , & Phimoltares, S. (2009). Tennis Winner Prediction based on Time-Series History with Neural Modeling. *Proceedings of the International MultiConference of Engineers and Computer Scientists, 1, 18-20 [Google Scholar]*

35. Szwarc, A. (2004). Effectiveness of Brazilian and German teams and the teams defeated by them during the 17th Fifa World Cup. Kinesiology, 83-89. *[Google Scholar]*

36. Singh Mandeep; Evaluation And Improvement Of Sports Techniques Through Biomechanical Updated Analyzing Technology; University News, Journal of Higher Education Association of Indian Universities; Vol. 48 No. 05, Feb 01-07, 2010,pp. 54-57. *[Google Scholar]*

37. Singh Mandeep; Analysis Of Set Shot In Basketball In Relation With The Time To Perform The Course And Displacement Of Center Of Gravity; American Journal of Sports Science-USA; Vol. 2 No. 5. Article: http://www. *Sciencepublishinggroup.com/journal/paperinfo? journalid=155&doi=10.11648/j.ajss.20140205.13 [Google Scholar]*

38. Singh Mandeep; A Study Of Aggression Among Adolloscent National Players In Relation To Sex, Famly And Ordinal Position; Journal of Sports, Physical Education Allied and Alternative Sciences; Vol. 01 No. 01 July2010,pp 50-55. *sciencepublishinggroup.com/journal/paperinfo? journalid=155&doi=10.11648/j.ajss.20140205.13 [Google Scholar] [Google Scholar]*

39. Wei Gu, T. L. , & Whitaker, S. a. *(2016). Expert System for Ice Hockey Game Prediction: Data Mining with Human Judgment. International Journal of Information Technology & Decision Making, 15(4), 763-789 [Google Scholar]*

40. Wright, C. , Atkins, S. , & Jones, B. (2012). *An analysis of elite coaches' engagement with performance analysis services (match, notational analysis and technique analysis). International Journal of Performance Analysis in Sport, 436-451 [Google Scholar]*

41. Yamada, H. , & Hayashi, Y. (2015). Characteristics of Goal-scoring Crosses in the international Soccer Tournaments. *JSSF, 12, 24-32 [Google Scholar]*

42. Zaveri, N. , Shah, U. , Tiwari, S. , Shinde, P. *, & Teli, L. K. (2018). Prediction of Football Match Score and Decision Making Process. International Journal on Recent and Innovation Trends in Computing and Communication, 6(2), 162 - 165 [Google Scholar]*