Comparing Soft Computing Techniques for Estimating Demand of Season Ticket Holders

International Journal of Computer Applications
Foundation of Computer Science (FCS), NY, USA

Volume 182
Number 20
Year of Publication: 2018

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10.5120/ijca2018917989

Abstract

Sports have macroeconomic effects and profound impacts on the level of development of countries. Therefore, sports economics deserves and receives attention in the literature. In this study, season ticket holders (STHs), who have a significant effect on sports economics, are the main concern. STHs have strategic and financial importance to professional sports teams. STHs play a key role on stadium economics of soccer teams. Considering these points, soft computing techniques, adaptive neuro-fuzzy inference system (ANFIS) and artificial neural network (ANN), were utilized to predict demand of season ticket holders of soccer clubs in this study. Real data of soccer clubs from multiple countries were used in the training and testing processes of the models. The performance measures indicated that both of the proposed models could be used for prediction purposes effectively. However, the ANFIS model with hybrid optimization outperformed the ANN model. Contrary to the studies concentrating on analyzing determinants of the STH demand, this study is the first for predicting the demand of season ticket holders by using two competitive methods.
References

1. Austria, S. 2012. Study on the contribution of sport to economic growth and employment in the EU. Final Report Retrieved from http://ec.europa.eu/sport/library/studies/study-contribution-spors-economic-growth-final-rpt. pdf. Accessed on August. 5: p. 2014.

2. Mandle, J.R. 2012. Sport and economic development: The case of Bangladesh.

3. Bloom, M.R., M.W. Grant, and D. Watt. 2005 Strengthening Canada: The socio-economic benefits of sport participation in Canada. Conference Board of Canada.

4. Wakefield, K.L. 2007. Team sports marketing. Elsevier.

5. McDonald, H. 2010. The Factors Influencing Churn Rates among Season Ticket Holders: An Empirical Analysis. Journal of Sport Management. 24(6): p. 676-701.

6. McDonald, H., A.J. Karg, and C. Leckie. 2014. Predicting which season ticket holders will renew and which will not. European Sport Management Quarterly. 14(5): p. 503-520.

7. Beccarini, C. and A. Ferrand. 2006. Factors Affecting Soccer Club Season Ticket Holders’ Satisfaction: The Influence of Club Image and Fans’ Motives. European Sport Management Quarterly. 6(1): p. 1-22.

8. McDonald, H., C. Leckie, A. Karg, and N. Zubcevic-Basic. 2017. Female season ticket holders: how their satisfaction is derived differently from males. European Sport Management Quarterly: p. 1-19.

9. Shaw, R.N. and H. McDonald. 2006. Season-ticket holder satisfaction and sponsor-related behaviour: evidence of a positive relationship. International Journal of Sports Marketing and Sponsorship. 7(4): p. 23-30.

10. McDonald, H., A.J. Karg, and A. Vocino. 2013. Measuring season ticket holder satisfaction: Rationale, scale development and longitudinal validation. Sport Management Review. 16(1): p. 41-53.

11. Schreyer, D., S.L. Schmidt, and B. Torgler. 2017. Predicting season ticket holder loyalty using geographical information. Applied Economics Letters: p. 1-6.

12. Borland, J. and R. MacDonald. 2003. Demand for sport. Oxford review of economic policy. 19(4): p. 478-502.

13. Buraimo, B. and R. Simmons. 2008. Do sports fans really value uncertainty of outcome? Evidence from the English Premier League. International Journal of Sport Finance. 3(3): p. 146.

14. Cox, A. 2015. Spectator demand, uncertainty of results, and public interest: Evidence from the English Premier League. Journal of Sports Economics: p. 1527002515619655.

15. Dobson, S. and J. Goddard. 2011. The Economics of Football. Cambridge University Press.

16. Dobson, S.M. and J.A. Goddard. 1992. The demand for standing and seated viewing accommodation in the English Football League. Applied Economics. 24(10): p. 1155-1163.

17. Forrest, D. and R. Simmons. 2002. Outcome uncertainty and attendance demand in sport: the case of English soccer. Journal of the Royal Statistical Society: Series D (The Statistician). 51(2): p. 229-241.

18. García, J. and P. Rodríguez. 2002. The determinants of football match attendance revisited: Empirical evidence from the Spanish football league. Journal of Sports Economics. 3(1): p. 18-38.

19. Martins, A.M. and S. Cró. 2016. The Demand for Football in Portugal: New Insights on Outcome Uncertainty. Journal of Sports Economics: p. 1527002516661602.
20. Pawlowski, T. and C. Anders. 2012. Stadium attendance in German professional football–The (un) importance of uncertainty of outcome reconsidered. Applied Economics Letters. 19(16): p. 1553-1556.

21. Peel, D.A. and D.A. Thomas. 1992. The demand for football: Some evidence on outcome uncertainty. Empirical Economics. 17(2): p. 323-331.

22. Reilly, B. 2015. The demand for league of Ireland football. The Economic and Social Review. 46(4, Winter): p. 485-509.

23. Rotshtein, A.P., M. Posner, and A. Rakityanskaya. 2005. Football predictions based on a fuzzy model with genetic and neural tuning. Cybernetics and Systems Analysis. 41(4): p. 619-630.

24. McCullagh, J. 2010. Data mining in sport: a neural network approach. International Journal of Sports Science and Engineering. 4(3): p. 131-138.

25. Purucker, M. 1996. Neural networks quarterbacking-how different training methods perform in calling the games. IEEE Potentials: p. 9-15.

26. Şahin, M. and R. Erol. 2018. Prediction of Attendance Demand in European Football Games: Comparison of ANFIS, Fuzzy Logic, and ANN. Computational Intelligence and Neuroscience. 2018: p. 14.

27. Şahin, M. and R. Erol. 2017. A Comparative Study of Neural Networks and ANFIS for Forecasting Attendance Rate of Soccer Games. Mathematical and Computational Applications. 22(4): p. 43.

**Index Terms**

Computer Science  
Artificial Intelligence

**Keywords**

Stadium Economics; ANFIS; Demand Forecasting; ANN