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PREVISÃO PRÁTICA DESPORTIVA RECORRENDO A SÉRIES TEMPORAIS

Forecasting sport practice with timeseries

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RESUMO

A preocupação em avaliar taxas de participação desportiva na europa (Rodgers, 1977) e em identificar as metodologias para medir e comparar (Hovemann & Wicker, 2009), pode ajudar a definição as políticas públicas destinadas a incentivar a participação na atividade física, antecipar o desenvolvimento do mercado de equipamento e materiais para o desporto (Tuyckom, Bracke & Scheerder, 2011), e orientar a aplicação dos recursos nas federações desportivas. A identificação do número potencial de praticantes inscritos nas federações desportivas é um problema de gestão (Camps & Pappous, 2016), nomeadamente, do ponto de vista estratégico para suportar a tomada de decisão sobre a afetação dos seus recursos.

As séries temporais têm sido frequentemente utilizadas para prever resultados de equipas ou as situações que podem melhorar suas chances de ganhar uma competição (Yiannakis, Selby, Douvis and Han, 2006), com base em resultados anteriores, no futebol (Stern, 1991), em basquetebol (Lopez & Matthews, 2015, Ruiz & Perez-Cruz 2015) ou no hóquei no gelo (Brockwell & Davis,1991). Considerando a importância na previsão do número de praticantes inscritos nas federações desportivas, desenvolvemos este estudo para suportar a tomada de decisão para o planeamento de recursos utilizando as séries temporais.

Para realizar a previsão dos praticantes nas federações foram utilizados dados de uma amostra com 22080 registos e 19 variáveis, representando a prática desportiva em todos os distritos portugueses desde 1999 até 2014, em 69 modalidades em vários escalões. Os dados obtidos foram consolidados calculando o total de praticantes de todas as modalidades. O tratamento de dados foi realizado com o Anaconda e IPython (Continuum Analytics, 2016), recorrendo ao Pandas (McKinney & others, 2010). As previsões foram desenvolvidas com 16 observações (16 anos) – valor que é considerado viável para series temporais de pequena dimensão (Makridakis & Hibon, 2000) – em R (R Development Core Team, 2008) utilizando a biblioteca *forecast* (Hyndman & Khandakar, 2008), recorrendo aos modelos *Exponential smoothing state space model* (ETS) e *Autoregressive Integrated Moving Average* (ARIMA) para determinar o número de praticantes para os quatro anos seguintes. Foram utilizados dois modelos com o intuito de confrontar

posteriormente qual apresenta maior exatidão face ao número de praticantes reais quando os dados estiverem disponibilizados, sendo obtido o número de praticantes previstos, o intervalo superior e inferior com 80% e 90% de confiança para cada um dos modelos.

Os resultados obtidos podem ser utilizados como orientações para as federações desportivas, entidades públicas financiadoras das federações desportivas e mercado de produtos e serviços de desporto para anteciparem as necessidades de recursos.

Palavras-chave: Gestão do desporto, previsão prática desportiva, séries temporais

ABSTRACT

The concern in assessing sport participation rates in Europe (Rodgers, 1977) and to identify the methodologies for measuring and comparing (Hovemann & Wicker, 2009), allow the definition of public policies encouraging the participation in physical activity, anticipate development of the market for equipment and materials for sport (Tuyckom, Bracke & Scheerder, 2011), and guide the application of resources in sports federations. The identification of the potential number of practitioners in sports federations is a management problem (Camps & Pappous, 2016), manly from a strategic point of view to support decision making on the allocation of their resources.

Time series have often been used to predict team results or situations that can improve their chances of winning a competition (Yiannakis, Selby, Douvis and Han, 2006), based on previous results, in soccer (Stern, 1991), basketball (Lopez & Matthews, 2015, Ruiz & Perez-Cruz 2015) or ice hockey (Brockwell & Davis, 1991). Considering the importance in predicting the number of practitioners enrolled in sports federations, we developed this study to support the decision making for the planning of resources using the time series.

To carry out the prediction of the practitioners in the federations, a data sample with 22080 registers and 19 variables was used, representing the practice of sport in all Portuguese districts from 1999 to 2014, in 69 modalities at various levels. The data obtained was consolidated calculating the total of practitioners of all modalities. Data processing was performed with Anaconda and IPython (Continuum Analytics, 2016), using Pandas (McKinney & others, 2010). The predictions were developed with 16 observations (16 years) - which is considered feasible for small time series (Makridakis & Hibon, 2000) - using R (R Development Core Team, 2008) with the library forecast (Hyndman & Khandakar, 2008), employing the Exponential smoothing state space model (ETS) and Autoregressive Integrated Moving Average (ARIMA) to determine the number of practitioners for the next four years. Two models were used to assess what is more accurate comparing to the actual number of practitioners when the data is available. Was obtained the expected number of practitioners, the upper and lower interval with 80% and 90% confidence for each one of the used models.

The results obtained can be used as guidelines for sports federations, public entities financing sports federations and the market for sport products and services to anticipate resource needs.

Keywords: Sport management, forecasting sport practice, time series

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