The identification of high potential archers based on fitness and motor ability variables: A Support Vector Machine approach

Zahari Taha[a], Rabiu Muazu Musa[a,b,*], Anwar P.P. Abdul Majeed[a],
Muhammad Muaz Alim[a], Mohamad Razali Abdullah[b]

[a] *Innovative Manufacturing, Mechatronics and Sports Laboratory, Faculty of Manufacturing Engineering, Universiti Malaysia Pahang, 26600 Pekan, Pahang, Malaysia*
[b] *Faculty of Applied Social Sciences, Universiti Sultan Zainal Abidin, 21300 Kuala Terengganu, Terengganu, Malaysia*

A R T I C L E   I N F O

A B S T R A C T

Support Vector Machine (SVM) has been shown to be an effective learning algorithm for classification and prediction. However, the application of SVM for prediction and classification in specific sport has rarely been used to quantify/discriminate low and high-performance athletes. The present study classified and predicted high and low-potential archers from a set of fitness and motor ability variables trained on different SVMs kernel algorithms.

50 youth archers with the mean age and standard deviation of 17.0 ± 0.6 years drawn from various archery programmes completed a six arrows shooting score test. Standard fitness and ability measurements namely hand grip, vertical jump, standing broad jump, static balance, upper muscle strength and the core muscle strength were also recorded. Hierarchical agglomerative cluster analysis (HACA) was used to cluster the archers based on the performance variables tested. SVM models with linear, quadratic, cubic, fine RBF, medium RBF, as well as the coarse RBF kernel functions, were trained based on the measured performance variables.

The HACA clustered the archers into high-potential archers (HPA) and low-potential archers (LPA), respectively. The linear, quadratic, cubic, as well as the medium RBF kernel functions models, demonstrated reasonably excellent classification accuracy of 97.5% and 2.5% error rate for the prediction of the HPA and the LPA.

The findings of this investigation can be valuable to coaches and sports managers to recognise high potential athletes from a combination of the selected few measured fitness and motor ability performance variables examined which would consequently save cost, time and effort during talent identification programme.