

Classification of javelin throwers using the sport results and Kohonen's maps

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Introduktion. Dynamical systems theory (DST) has the power to potentially unify existing sub-disciplines such as sports biomechanics, notational analysis, motor control, physiology and psychology under one macroscopic platform. Many researchers confirm growing significance of the process of modeling with regard to the utilization of Artificial Neural Networks (ANNs) in the optimization of selection and training processes. The aim of this study was to present the results of analyses conducted by means of complementary analytic tools in order to verify their efficacy and the hypothesis that Kohonen's neural models may be applied in the classification process of javelin throwers.

Methods. A group of 35 javelin throwers, aged (21 ± 0.5 yr.) took part in this research. Laboratory tests determining power, body mass and body composition, specific field tests evaluating basic motor abilities and technique as well as mathematical modeling were used for data collection. The data were collected twice, first, initial evaluations were carried out and then, the same tests were repeated after a 12 month training period. For the purpose of verification of usefulness of Kohonen's Neural Models, statistical analyses were carried out on the basis of results of the javelin throws from the full run up.

Results. Based on calculated regression equation coefficients (st. error B), it can be stated that such qualities was: body height, 5 m sprint, cross step with assuming the throwing stance and standing quintuple jump have considerable influence on predicting the dependent variable Y - distance of the javelin throw for the studied subjects. The colour saturation scale was used in addition to numbering the neurons representing particular cases. This scale was created upon identifying the map areas by means of familiar results of the dependent variable Y - distance of the javelin throw (very good: 71-67.02m; good: 67.01-61.56m and average: 61.55-54.9m). The classification table created on the basis of learning sets for Y – results of javelin throws, in the Kohonen's network can be useful in assessing new objects, not presented during learning. This results from evident, clear ordering of explained variable value corresponding

to particular neurons - one point to large areas of the map containing neighbouring neurons corresponding to approximate values of the explained variable.

Discussion and conclusions. Recent theoretical contributions to the theory of talent in sport have clearly shown that a complex and longitudinal framework is necessary to successfully address talent identification and the talent promotion issue in most sports. This paper aimed at finding out whether the talent development outcome can be modeled by means of the nonlinear mathematical method of artificial neural networks. The results of this research confirm that Kohonen's Feature Map can be used for optimization of javelin throwers sport classification and prediction of sports results. On the grounds of analysis of standardized Beta values one can say that the biggest predictability for the distance of the javelin throw was shown by such qualities as: body height, 5m sprint, cross step with assuming the throwing stance and the standing quintuple jump.

Key words: *Kohonen feature map, javelin throw, sports selection, regression analysis, prediction of sports results.*