

Kinematic Variables Defining Performance of Basketball Free-Throw in Novice Children: An Information Gain and Logistic Regression Analysis



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Abstract The current investigation is designed to determine the relevant kinematic variables (KV) that could define the performance of basketball free-throw in novice children via the application of machine learning analysis. A number of seven different KV were examined from 15 children (mean age 9.93 ± 0.55 years) that constituted actions from the shoulder, elbow, wrist, knee, hand velocity, flexion as well as extension stages. The children completed 4 blocks of 15 trials of basketball free-throw tasks from a standing position 3 meters away from the front of the board using modified equipment. The data of the kinematics variables were collected in a controlled laboratory environment with 2D dimensional video data acquisition process. An information gain (IG) analysis is applied to extract the KV that could best describe successful and fail throw performance whilst Logistic Regression model (LR) was used to ascertain the predictability of the extracted KV in defining the performance of the throws. The IG extracted a set of 4 kV that could best describe the successful and fail throw performances namely, shoulder movement, knee, elbow as well as wrist kinematics. The LR model was able to provide a reasonably good prediction rate of 88% with respect to the extracted KV. The approach utilised in the present study provides useful information in identifying kinematics patterns that could best

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