

Artificial Intelligence in Sports on the Example of Weight Training

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ABSTRACT

The overall goal of the present study was to illustrate the potential of artificial intelligence (AI) techniques in sports on the example of weight training. The research focused in particular on the implementation of pattern recognition methods for the evaluation of performed exercises on training machines. The data acquisition was carried out using way and cable force sensors attached to various weight machines, thereby enabling the measurement of essential displacement and force determinants during training. On the basis of the gathered data, it was consequently possible to deduce other significant characteristics like time periods or movement velocities. These parameters were applied for the development of intelligent methods adapted from conventional machine learning concepts, allowing an automatic assessment of the exercise technique and providing individuals with appropriate feedback. In practice, the implementation of such techniques could be crucial for the investigation of the quality of the execution, the assistance of athletes but also coaches, the training optimization and for prevention purposes. For the current study, the data was based on measurements from 15 rather inexperienced participants, performing 3-5 sets of 10-12 repetitions on a leg press machine. The initially preprocessed data was used for the extraction of significant features, on which supervised modeling methods were applied. Professional trainers were involved in the assessment and classification processes by analyzing the video recorded executions. The so far obtained modeling results showed good performance and prediction outcomes, indicating the feasibility and potency of AI techniques in assessing performances on weight training equipment automatically and providing sportsmen with prompt advice.

Key words: Artificial intelligence, machine learning, pattern recognition, weight training, feedback

Key Points

- Artificial intelligence is a promising field for sport-related analysis.
- Implementations integrating pattern recognition techniques enable the automatic evaluation of data measurements.
- Artificial neural networks applied for the analysis of weight training data show good performance and high classification rates.

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