

The importance of GPS features to describe elite football training

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Aim: The development of valid methods for assessing training-load is essential in football because extreme training responses may result in training maladaptation and injuries (Ehrmann et al., 2016). Thus, the aim of this study was to investigate GPS features importance to describe football training.

Methods: Twenty-six elite football players (age=26±4yrs; BMI=24.01±0.86) competing in the Italian Serie B were monitored (23 weeks, 5 training per week). Training-load data were collected during 2080 individual training sessions using a portable non-differential 10Hz GPS integrated with 100Hz 3-D accelerometer, a 3-D gyroscope, a 3-D digital compass (STATSports Viper, Northern Ireland). Seven training-load indexes were recorded: total distance (m); High Speed Running Distance (distance(m) covered above 19.8Km/h); Metabolic Distance (distance(m) covered above 20W/Kg); High Metabolic Load Distance (distance(m) covered above 25.5W/Kg); Explosive Distance (distance(m) covered above 25.5W/Kg and below 19.8Km/h); Acceleration>2m/s² (n); Deceleration>2m/s² (n). The min-max standard scaler was applied in each features to standardize data of each player reducing the intra-individual differences. The feature importance percentage to describe the weekly training was based on extra random classifier (RFC). Precision and recall of the supervised cluster algorithm were provided to assess its ability to classify data correctly in accordance with the labelled training data.

Results: RFC algorithm had precision and recall of 63% and 62% to predict weekly training, respectively. The features importance based on RFC algorithm showed the following rank: Metabolic distance (17.9%), Acceleration>2m/s² (15.2%), total distance (14.7%), Deceleration>2m/s² (14.4%), Explosive distance (13.6%), High Metabolic Load Distance (13.4%) and High Speed Running Distance (10.8%).

Discussion: These results suggest that an index created using features with higher importance (Metabolic distance and Acceleration>2m/s²) could be used to characterize elite football training.

Reference

Ehrmann FE, Duncan CS, Sindhusake D, Franzsen WN, Greene DA (2016) GPS and Injury Prevention in Professional Soccer. *J Strength Cond Res* 30:360–367