

Machine Learning-Enabled Classification of Climbing Using Small Data

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Abstract : Athlete performance scoring within the climbing do-main presents interesting challenges as the sport does not have an objective way to assign skill. Assessing skill levels within any sport is valuable as it can be used to mark progress while training, and it can help an athlete choose appropriate climbs to attempt. Machine learning-based methods are popular for complex problems like this. The dataset available was composed of dynamic force data recorded during climbing; however, this dataset came with challenges such as data scarcity, imbalance, and it was temporally heterogeneous. Investigated solutions to these challenges include data augmentation, temporal normalization, conversion of time series to the spectral domain, and cross validation strategies. The investigated solutions to the classification problem included light weight machine classifiers KNN and SVM as well as the deep learning with CNN. The best performing model had an 80% accuracy. In conclusion, there seems to be enough information within climbing force data to accurately categorize climbers by skill.

Keywords : classification,climbing,data imbalance,data scarcity,machine learning,time sequence

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