

Developing a Hybrid Method to Diagnose and Predict Sports Related Concussions with Machine Learning

Authors : Melody Yin

Abstract : Concussions impact a large amount of adolescents; they make up as much as half of the diagnosed concussions in America. This research proposes a hybrid machine learning model based on the combination of human/knowledge-based domains and computer-generated feature rankings to improve the accuracy of diagnosing sports related concussion (SRC). Using a data set of symptoms collected on the sideline post-SRC events, the symptom selection criteria method has been developed by using Google AutoML's important score function to identify the top 10 symptom features. In addition, symptom domains have been introduced as another parameter, categorizing the symptoms into physical, cognitive, sleep, and emotional domains. The hybrid machine learning model has been trained with a combination of the top 10 symptoms and 4 domains. From the results, the hybrid model was the best performer for symptom resolution time prediction in 2 and 4-week thresholds. This research is a proof of concept study in the use of domains along with machine learning in order to improve concussion prediction accuracy. It is also possible that the use of domains can make the model more efficient due to reduced training time. This research examines the use of a hybrid method in predicting sports-related concussion. This achievement is based on data preprocessing, using a hybrid method to select criteria to achieve high performance.

Keywords : hybrid model, machine learning, sports related concussion, symptom resolution time

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