عنوان مقاله:

Body Composition Prediction based on Simple Anthropometric and Demographic Measures Using Machine Learning Methods

محل انتشار:

اولین کنگره بین المللی هوش مصنوعی در علوم پزشکی (سال: 1402)

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خلاصه مقاله:

Background and aims: body composition (e.g. fat mass and muscle mass) is an important riskindicator for cardiovascular and metabolic diseases. In addition, applying body composition hasan important role in the evaluation of sports performance and the results of diet therapy. However,the techniques and devices need to evaluate body composition are expensive and not easilyavailable. Using machine learning methods can be a valuable approach to estimate body compositionbased on simple anthropometric and demographic measurements, instead of expensivetechniques. This study aimed to develop machine learning prediction models applying simpleanthropometric and demographic measurements that can estimate the percent of body fat (BF%)and the percent of body muscle (BM%).Method: This research was conducted on ۹۰۱۴ adults from The Yazd Health Study (YaHS). Inputfeatures were age, sex, weight, height, waist circumference, hip circumference, neck circumference,and body mass index. Body compositions were measured using an Omron body analyzer.The prediction models were developed based on linear regression, random forest, support vectorregression, and XGBoost regression. The goodness-of-fit was determined by the coefficient ofdetermination (R۲), mean absolute error (MAE), and mean absolute percentage error (MAPE).Results: The mean ± SD of BF% and BM% in the total population was ۳۲.۶ ± ۱۰.۹ and ۳۰.۰± ۶.۵, respectively. Among the used machine learning methods, the random forest had the bestperformance in body composition prediction. So, the highest yielded values for BF% and BM%were ۰.۸۹ and ۰.۷۸. The lowest MAE and MAEP values for BF% were ۲.۶ and ۰.۱, and for BM%were ۲.۱ and ۰.۰۸.Conclusion: Machin learning methods (especially random forest) have been able to create inexpensivebut effective models for estimating body composition that can easily be

.used in medicaland diet therapy clinics and sports clubs

کلمات کلیدی:
Fat mass, muscle mass, body composition, machine learning, random forest