EUROPEAN RESPIRATORY journal
FLAGSHIP SCIENTIFIC JOURNAL OF ERS

VO2 prediction based on physiologic and mechanical exercise measurements

M A Pacheco Pereira, R Almeida, H Dias

European Respiratory Journal 2022 60: 4270; **DOI:** 10.1183/13993003.congress-2022.4270

Article | Info & Metrics

Abstract

The Cardiopulmononary Exercise Test (CPET) is a diagnostic test that evaluates the functional capacity of na individual through the integrated response of the cardiovascular, respiratory and metabolic systems. VO_2max is the parameter that acess functional capacity, although it's difficult to achieve given the effort that implies.

In recent years, an increase in computing capabilities combined with available storage of large amounts of information has led to a heightened interest in machine learning (ML).

We aimed in this study to enable CPET with ML models that allow predicting oxygen consumption in healthy individuals.

The study methodology is based on the cleaning and exploratory analysis of a public database with about 992 CPET performed on healthy individuals and athletes.

To predict the each value of VO_2 (~569,000 instances), five ML algorithms were used (Random Forests, kNN, Neural Networks, Linear Regression and SVM) with heart rate, respiratory rate, time from the beginning of the exame and treadmill speed, using a 20-fold cross-validation.

The best result came from the Random Forest model, with a R^2 of 0.88 and a RMSE of 334.34 $ml.min^{-1}$.

Futhermore, using the same methodology but different features, we tried to predict the the VO_2max with the 724 adult participants with a maximal test (RER≥1.05) but weaker results were obtained (best model was the Linear Regression, with a R^2 of 0.50 and a RMSE of 498.06 ml.min^{-1}). Still, this model showed a better correlation with the real VO_2max than the Wasserman equation (R=0.71 vs R=0.59).

It's possible to predict with accuracy breath-by-breath VO_2, based in easy-to-obtain physiological and mechanical measurements.

Physical activity Physiological diagnostic services

Footnotes

Cite this article as *Eur Respir J* 2022; 60: Suppl. 66, 4270.

This article was presented at the 2022 ERS International Congress, in session "-".

Previous

Back to top

Vol 60 Issue suppl 66 Table of Contents

Table of Contents

Index by author

Email Request Permissions

Citation Tools Share

Jump To

Article

Info & Metrics