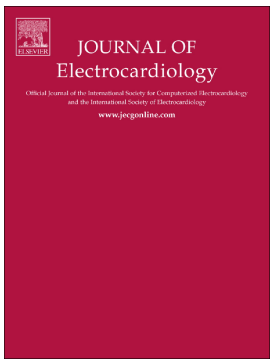

The Association between Reconstructed Phase Space and Artificial Neural Networks for Vectorcardiographic Recognition of Myocardial Infarction

Cecília M. Costa, Ittalo S. Silva, Rafael D. de Sousa, Renato A. Hortegal, Carlos Danilo M. Regis

PII: S0022-0736(18)30090-6
DOI: https://doi.org/10.1016/j.jelectrocard.2018.02.001
Reference: YJELC 52569

To appear in:

Please cite this article as: Cecília M. Costa, Ittalo S. Silva, Rafael D. de Sousa, Renato A. Hortegal, Carlos Danilo M. Regis , The Association between Reconstructed Phase Space and Artificial Neural Networks for Vectorcardiographic Recognition of Myocardial Infarction. The address for the corresponding author was captured as affiliation for all authors. Please check if appropriate. Yjelc(2018), https://doi.org/10.1016/j.jelectrocard.2018.02.001

The Association between Reconstructed Phase Space and Artificial Neural Networks for Vectorcardiographic Recognition of Myocardial Infarction

Cecília M. Costa [a], Ittalo S. Silva [a], Rafael D. de Sousa [a],
Renato A. Hortegal [b], Carlos Danilo M. Regis [a c]

[a] Federal Institute of Paraíba, João Pessoa - PB, Brazil;

[b] Dante Pazzanese Institute of Cardiology, São Paulo - SP, Brazil

[c] Corresponding Author, Federal Institute of Paraíba, Av. Primeiro de Maio, 720, João Pessoa - PB, Brazil, mail address: carlos.regis@ifpb.edu.br

Abstract

Myocardial infarction is one of the leading causes of death worldwide. As it is life threatening, it requires an immediate and precise treatment. Due to this, a growing number of research and innovations in the field of biomedical signal processing is in high demand. This paper proposes the association of Reconstructed Phase Space and Artificial Neural Networks for Vectorcardiography Myocardial Infarction Recognition. The algorithm promotes better results for the box size 10 x 10 and the combination of four parameters: box counting (Vx), box counting (Vz), self-similarity method (Vx) and self-similarity method (Vy) with sensitivity=92%, specificity=96% and accuracy=94%. The topographic diagnosis presented different performances for different types of infarctions with better results for anterior wall infarctions and less accurate results for inferior infarctions.

Keywords: Digital Signal Processing; Artificial Neural Networks; Electrocardiogram; Phase Space Reconstruction; Myocardial Infarction.

Introduction

Myocardial Infarction (MI) is a spectrum of Acute Coronary Syndromes (ACS), which may range from patients with mild symptoms at presentation to those with severe chest pain or even cardiac arrest [1,2].

An early identification of MI is a crucial step that requires promptness, agility and precision. Therefore, a growing number of research and innovations in the field of biomedical signal processing is favored.