

Abstract Title:

Machine Learning Algorithms at Myocardial Perfusion Imaging: a Preliminary Study

Authors:

D. Vieira¹, E. Silva², M.F. Machado³, L. Cunha¹, L.F. Metello¹

Affiliation:

1 – Nuclear Medicine Department of the High Institute for Allied Health Technologies of Porto,

Polytechnic Institute of Porto (ESTSP.IPP), VN Gaia, Portugal

2 – IT Dept, S.Cosme Clinic, Gondomar, Portugal

3 – ALERT SA, VN Gaia, Portugal

Abstract Text:

Introduction: A major focus of data mining process - especially machine learning researches - is to automatically learn to recognize complex patterns and help to take the adequate decisions strictly based on the acquired data. Since imaging techniques like MPI – Myocardial Perfusion Imaging on Nuclear Cardiology, can implicate a huge part of the daily workflow and generate gigabytes of data, there could be advantages on Computerized Analysis of data over Human Analysis: shorter time, homogeneity and consistency, automatic recording of analysis results, relatively inexpensive, etc.

Objectives: The aim of this study relates with the evaluation of the efficacy of this methodology on the evaluation of MPI Stress studies and the process of decision taking concerning the continuation – or not – of the evaluation of each patient. It has been pursued has an objective to automatically classify a patient test in one of three groups: “Positive”, “Negative” and “Indeterminate”. “Positive” would directly follow to the Rest test part of the exam, the “Negative” would be directly exempted from continuation and only the “Indeterminate” group would deserve the clinician

analysis, so allowing economy of clinician's effort, increasing workflow fluidity at the technologist's level and probably sparing time to patients.

Methods: WEKA v3.6.2 open source software was used to make a comparative analysis of three WEKA algorithms ("OneR", "J48" and "Naïve Bayes") - on a retrospective study using the comparison with correspondent clinical results as reference, signed by nuclear cardiologist experts - on "SPECT Heart Dataset", available on University of California – Irvine, at the Machine Learning Repository. For evaluation purposes, criteria as "Precision", "Incorrectly Classified Instances" and "Receiver Operating Characteristics (ROC) Areas" were considered. Results: The interpretation of the data suggests that the Naïve Bayes algorithm has the best performance among the three previously selected algorithms.

Conclusions: It is believed - and apparently supported by the findings - that machine learning algorithms could significantly assist, at an intermediary level, on the analysis of scintigraphic data obtained on MPI, namely after Stress acquisition, so eventually increasing efficiency of the entire system and potentially easing both roles of Technologists and Nuclear Cardiologists. In the actual continuation of this study, it is planned to use more patient information and significantly increase the population under study, in order to allow improving system accuracy.

Foi decidido que não será apresentada a versão integral deste documento.

Para obtenção de mais informações:

www.nucmedonline.net

cursomedicinanuclear@gmail.com

It has been decided that it would not be shown the entire version of this document.

To obtain more informations:

www.nucmedonline.net

cursomedicinanuclear@gmail.com