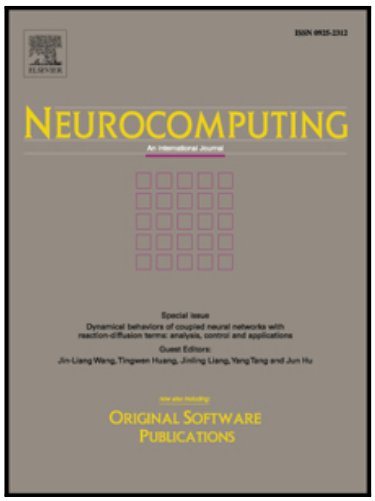

Gaussian process classification for prediction of in-hospital mortality among preterm infants

Olli-Pekka Rinta-Koski, Simo Särkkä, Jaakko Hollmén,
Markus Leskinen, Sture Andersson

PII: S0925-2312(18)30208-X
DOI: 10.1016/j.neucom.2017.12.064
Reference: NEUCOM 19352

To appear in: *Neurocomputing*

Received date: 4 July 2017
Revised date: 10 November 2017
Accepted date: 21 December 2017

Please cite this article as: Olli-Pekka Rinta-Koski, Simo Särkkä, Jaakko Hollmén, Markus Leskinen, Sture Andersson, Gaussian process classification for prediction of in-hospital mortality among preterm infants, *Neurocomputing* (2018), doi: 10.1016/j.neucom.2017.12.064

Gaussian process classification for prediction of in-hospital mortality among preterm infants

Olli-Pekka Rinta-Koski[a,*], Simo Särkkä[b], Jaakko Hollmén[a], Markus Leskinen[c], Sture Andersson[c]

[a] *Aalto University, Department of Computer Science, PO Box 15400, FI-00076 Aalto, Finland*
[b] *Aalto University, Department of Electrical Engineering and Automation, PO Box 12200, FI-00076 Aalto, Finland*
[c] *University of Helsinki, and Helsinki University Hospital, PO Box 140, FI-00029 HUS, Finland*

Abstract

We present a method for predicting preterm infant in-hospital mortality using Bayesian Gaussian process classification. We combined features extracted from sensor measurements, made during the first 72 hours of care for 598 Very Low Birth Weight infants of birth weight <1500 g, with standard clinical features calculated on arrival at the Neonatal Intensive Care Unit. Time periods of 12, 18, 24, 36, 48, and 72 hours were evaluated. We achieved a classification result with area under the receiver operating characteristic curve of 0.948, which is in excess of the results achieved by using the clinical standard SNAP-II and SNAPPE-II scores.

Keywords: time series prediction; Gaussian process classification; very low birth weight infants; neonatal intensive care

1. Introduction

This article is related to the use of data-driven methods in the context of digital healthcare and health informatics [1, 2]. In particular, our aim is to develop

*Corresponding author
Email addresses: olli-pekka.rinta-koski@aalto.fi (Olli-Pekka Rinta-Koski), simo.sarkka@aalto.fi (Simo Särkkä), jaakko.hollmen@aalto.fi (Jaakko Hollmén), markus.leskinen@hus.fi (Markus Leskinen), sture.andersson@hus.fi (Sture Andersson)