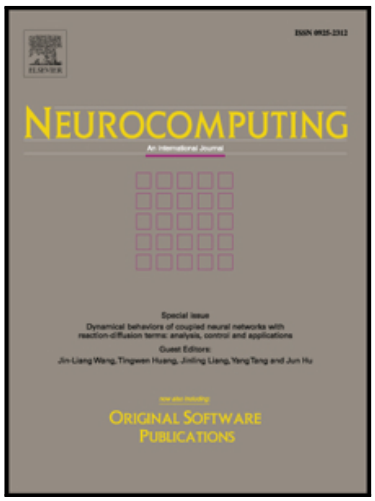

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PII: S0925-2312(18)30907-X
DOI: https://doi.org/10.1016/j.neucom.2018.08.001
Reference: NEUCOM 19825

To appear in: *Neurocomputing*

Received date: 16 September 2016
Revised date: 1 November 2017
Accepted date: 1 August 2018

Please cite this article as: Ruhao Wu , Bo Wang , Gaussian process regression method for forecasting of mortality rates, *Neurocomputing* (2018), doi: https://doi.org/10.1016/j.neucom.2018.08.001

Gaussian process regression method for forecasting of mortality rates

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Abstract

Gaussian process regression (GPR) has long been shown to be a powerful and effective Bayesian nonparametric approach, and has been applied to a wide range of fields. In this paper we present a new application of Gaussian process regression methods for the modelling and forecasting of human mortality rates. The age-specific mortality rates are treated as time series and are modelled by four conventional Gaussian process regression models. Furthermore, to improve the forecasting accuracy we propose to use a weighted mean function and the spectral mixture covariance function in the GPR model. The numerical experiments show that the combination of the weighted mean function and the spectral mixture covariance function provides the best performance in forecasting long term mortality rates. The performance of the proposed method is also compared with three existing models in the mortality modelling literature, and the results demonstrate that the GPR model with the weighted mean function and the spectral mixture covariance function provides a more robust forecast performance.

Key words: Gaussian process regression, Lee-Carter model, mortality forecasting, spectral mixture, weighted mean function

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