Phase Space Prediction of Chaotic Time Series with Nu-Support Vector Machine Regression

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Abstract: A new class of support vector machine, nu-support vector machine, is discussed which can handle both classification and regression. We focus on nu-support vector machine regression and use it for phase space prediction of chaotic time series. The effectiveness of the method is demonstrated by applying it to the Hénon map. This study also compares nu-support vector machine with back propagation (BP) networks in order to better evaluate the performance of the proposed methods. The experimental results show that the nu-support vector machine regression obtains lower root mean squared error than the BP networks and provides an accurate chaotic time series prediction. These results can be attributable to the fact that nu-support vector machine implements the structural risk minimization principle and this leads to better generalization than the BP networks.

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