

Piotr Przymus

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE, NICOLAUS COPERNICUS UNIVERSITY, CHOPINA 12/18, 87-100 TORUŃ, POLAND

e-mail: eror@mat.umk.pl,

Krzysztof Rykaczewski

FACULTY OF MATHEMATICS AND COMPUTER SCIENCE, NICOLAUS COPERNICUS UNIVERSITY, CHOPINA 12/18, 87-100 TORUŃ, POLAND

e-mail: mozgun@mat.umk.pl

Recurrence plot analysis of time series derived from observations of *Dreissena polymorpha*

Biological Early Warning Systems provide a rapid warning of the occurrence of contaminants in water at concentrations which could be immediate threat to living organisms. In our work we use long-term observations of freshwater mussels for monitoring water contamination. This paper presents a recurrence plot (RP) based approach to analyse data derived from the observations of *Dreissena polymorpha*. Studying the non-linear characteristics of data sequences can assist in understanding the relationships between measured mussel activities and actual state in surrounding environment. Data sequences are extended to m -dimensional phase space and then we use recurrence plots to visualize recurrences of trajectories of dynamical systems. Finally, the recurrence quantification analysis (RQA) is used to quantify the structures found in RPs and to classify them. In order to check the effectiveness of this approach, we need to examine the adequacy of the methods used at various stages of analysis. Therefore, we will discuss usage of various parameters for RP and RQA and classification methods (SVM, KNN, FDA, SRDA, PDA, DLDA). Preliminary experiments and previous results of work show that such formulation of the problem allows to extract relevant information from signal and lead to effective solutions to considered problem. It is found, for example, that RQA may support identification of the effects of pollution in the water.

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