Modeling Water Level Fluctuation in River Basins Using Singular Spectrum Analysis

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Water scarcity affected 29% of the EU territory during at least one season in 2019. In the face of climate change, it is very important to understand the risk of water scarcity. Water scarcity is becoming a growing problem in southern European countries, such as Portugal. In 2019, Portugal, faced one of the most significant water scarcity conditions in the EU-27 on the seasonal scale (seasonal WEI 66%).The main objective of this work is to study the water level fluctuation in river basins, in order to predict the risks of lack of water. The study area is located in 29 reservoirs from different river basins in Portugal. The collected data refer to the period from November 1993 to August 2022, with a total number of records of 9686. We started by improving the quality of the data and built a monthly time series of the volume of water stored. Next, we analyzed the time series using Singular Spectrum Analysis (SSA), which is a non-parametric technique for analyzing time series.

Keywords: risk, water scarcity, time series, singular spectrum analysis.

References

Golyandina N., Nekrutkin V., Zhigljavsky A. 2001. *Analysis of Time Series Structure: SSA and related techniques*. Chapman & Hall/CRC.

Golyandina N., Zhigljavsky A. 2013. *Singular Spectrum Analysis for Time Series.* Springer.

Mahmoudvand R., Najari N., Zokaei M. 2013. *On the Parameters for Reconstruction and Forecasting in the Singular Spectrum Analysis*. Communication in Statistics: Simulations and Computations, Vol. 42, 860-870.

Rodrigues C. P., Mahmoudvand R. 2016. *Correlation Analysis in Contaminated Data by Singular Spectrum Analysis*. Quality and Reliability Engineering International, Forthcoming: doi: 10.1002/qre.2027.

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