JWARP> Vol.4 No.7, July 2012

OPEN ACCESS

Multistep-ahead River Flow Prediction using LS-SVR at Daily Scale

PDF (Size:1882KB) PP. 528-539 DOI: 10.4236/jwarp.2012.47062

Author(s)

Parag P. Bhagwat, Rajib Maity

ABSTRACT

In this study, potential of Least Square-Support Vector Regression (LS-SVR) approach is utilized to model the daily variation of river flow. Inherent complexity, unavailability of reasonably long data set and heterogeneous catchment response are the couple of issues that hinder the generalization of relationship between previous and forthcoming river flow magnitudes. The problem complexity may get enhanced with the influence of upstream dam releases. These issues are investigated by exploiting the capability of LS-SVR – an approach that considers Structural Risk Minimization (SRM) against the Empirical Risk Minimization (ERM) – used by other learning approaches, such as, Artificial Neural Network (ANN). This study is conducted in upper Narmada river basin in India having Bargi dam in its catchment, constructed in 1989. The river gauging station – Sandia is located few hundred kilometer downstream of Bargi dam. The model development is carried out with pre-construction flow regime and its performance is checked for both pre- and post-construction of the dam for any perceivable difference. It is found that the performances are similar for both the flow regimes, which indicates that the releases from the dam at daily scale for this gauging site may be ignored. In order to investigate the temporal horizon over which the prediction performance may be relied upon, a multistep-ahead prediction is carried out and the model performance is found to be reasonably good up to 5-day-ahead predictions though the performance is decreasing with the increase in lead-time. Skills of both LS-SVR and ANN are reported and it is found that the former performs better than the latter for all the lead-times in general, and shorter lead times in particular.

KEYWORDS

Multistep-ahead Prediction; Kernel-based Learning; Least Square-Support Vector Regression (LS-SVR); Daily River Flow; Narmada River

Cite this paper

P. Bhagwat and R. Maity, "Multistep-ahead River Flow Prediction using LS-SVR at Daily Scale," *Journal of Water Resource and Protection*, Vol. 4 No. 7, 2012, pp. 528-539. doi: 10.4236/jwarp.2012.47062.

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