Research Paper

Hydrogeomorphology, Vol. 10, No. 33, Winter 2003, pp (27-28)

Received: 2022.09.08
Accepted: 2021.11.21

Analysis and Evaluation of Hybrid Meta-Exploration Models in Groundwaters Level Simulation in Khorram Abad Plain

Ali-Haider Nasralhi *[1], Yaser Sabzevari [2]

1- Assistant Professor, Department of Water Engineering, Lorestan University, Khorramabad, Iran,
2- Ph.D. student, Department of Water Engineering, Isfahan University of Technology, Isfahan, Iran

1-Introduction

Indiscriminate exploitation of underground water resources in recent years has caused its natural balance to be disrupted and the level of underground water in aquifers in many parts of the country has become negative. To know the status of these resources and their optimal management, it is necessary to accurately predict the fluctuations of the underground water level. Most hydrological time series, such as changes in the underground water level, always include unpredictable and complex processes that cannot be well described and modeled using conventional and classic linear models. Therefore, to model these hydrological phenomena, it is necessary to use non-linear models .Today, intelligent systems are widely used to predict nonlinear phenomena. In recent years, the use of smart methods in the quantitative studies of underground water has attracted the attention of researchers.

2-Methodology

Khorramabad plain is located in the center of Lorestan province in Iran between latitudes 33 degrees and 13 minutes to 33 degrees and 35 minutes north and longitudes 47 degrees and 52 minutes to 48 degrees and 46 minutes east. The main aquifer of Khorram Abad plain is formed by alluvial sediments. This plain has 4 piezometer wells with homogeneous statistics and lacks statistics and missing information. Also, for modeling, the parameters of precipitation (P), temperature (T) and underground water level (H), and withdrawal from water sources (q) were used monthly, which were available in the Lorestan Regional Water Company from 2001 to 2021. In this study, the hybrid models of support vector regression-wavelet, bat support vector regression, and support vector regression-gray wolf were used.

* Corresponding Authors; **E-mail:**nasrolahi.a@lu.ac.ir

3-Results and Discussion

After choosing the best input combination for each model, the simulation of the groundwater level of piezometric wells, according to Table 3, shows that for all four piezometric wells, the support vector-wavelet regression hybrid model performs better than other hybrid models, including the support vector-bat regression. Support vector regression - Gray wolf has such that according to the evaluation indices of the models, this model has values of R=0.978, RMSE=0.221 m, MAE=0.011 m, NS=0.985 in the piezometric well of Sarab Pardah and also has values of R=0.981 in the piezometric well of Naservand. , RMSE=0.168 m, MAE=0.008 m, 0.991 NS= and also the Sally piezometric well with R=0.980, RMSE=0.186 m, MAE=0.010 m, 0.986 NS= and finally Baba Hossein piezometric well with R=0.985 values, RMSE=0.101 m, MAE=0.007 m, NS=0.995. In general, it can be stated that the wavelet-support vector regression model has the best performance, and the bat-support vector regression model, the gray wolf-support vector regression model has the weakest performance.

4-Conclusions

The results of the performance of hybrid models of support vector regression-wavelet, support vector regression-bat, and support vector regression-gray wolf according to the statistical period of 2001-2021 showed that the investigated models in the combined structure including all input parameters have better performance due to increased memory, and the support vector-wavelet regression model has more accuracy and less error than the other investigated models, and this is due to the separation of signals into two categories, high-pass, and low-pass, in the WT wavelet transformation.

Keywords: Groundwater level, Simulation, Hybrid model, Khorramabad Plain.