Efficient Neural Network for Downscaling climate scenarios

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Abstract

A reliable and accurate downscaling model which can provide climate change information, obtained from global climate models (GCMs), at finer resolution has been always of great interest to researchers. In order to achieve this model, linear methods widely have been studied in the past decades. However, nonlinear methods also can be potentially beneficial to solve downscaling problem. Therefore, this study explored the applicability of some nonlinear machine learning techniques such as neural network (NN), extreme learning machine (ELM), and ELM autoencoder (ELM-AE) as well as a linear method, least absolute shrinkage and selection operator (LASSO), to build a reliable temperature downscaling model. ELM is an efficient learning algorithm for generalized single layer feed-forward neural networks (SLFNs). Its excellent training speed and good generalization capability make ELM an efficient solution for SLFNs compared to traditional time-consuming learning methods like back propagation (BP). However, due to its shallow architecture, ELM may not capture all of nonlinear relationships between input features. To address this issue, ELM-AE was tested in the current study for temperature downscaling.

Keywords : Autoencoder, Climate Scenarios, Downscaling, ELM, Temperature

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