



A Genetic Neural Network Model for Rainstorm Prediction

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A rainstorm prediction scheme has been developed based on the physical quantities of the NCEP/NCAR reanalysis data as potential predictors and using genetic neural network (GNN) model. In GNN, neural network employs genetic algorithm's global random search ability for optimizing its weights, thresholds, and number of hidden nodes, obtaining adequate network architecture. Rainstorm samples from Guangxi, China spanning 2007-2017 are used for model development. The GNN model input is constructed from potential predictors by using a Principal Component Analysis (PCA) algorithm. The PCA algorithm is a technique used to emphasize variation and bring out strong patterns in a dataset. It's often used to make data easy to explore and visualize. In this scheme, the new GNN model is used for daily precipitation prediction at 89 stations covering Guangxi. Using identical modeling samples and independent samples, predictions of the GNN model are compared with the widely used stepwise regression method in terms of the performance of rainstorm prediction at 89 stations in Guangxi. The mean absolute error and threat score (TS) results were employed to assess the predicted outcomes. Results show that the GNN model is superior to stepwise regression method for rainstorm prediction, and tends to have a higher prediction accuracy, a stable prediction capability and robust generalization capability.