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Neural and statistical classifiers in estimating rain rate by using weather radar measurements

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The neural network self-organizing map (SOM) classifier and the statistical k-nearest neighbor (KNN) classifier were implemented, in an effort to test whether they can be used in estimating rain rate from radar data. Radar data were employed as input and rain-gauge measurements as output. The results from using the above two methods were compared to estimations reached by using the traditional power-law. In this endeavor, data from radar and surrounding rain gauges on the Swiss Alps were used.

The power-law yielded a mean error rate of 1.276; this error rate was found to be significantly higher than the error rates of 1.059 obtained by the SOM and 0.974 obtained by the KNN.

The results of the present work suggest that the estimation of rain rate on weather radar records with methodologies based on SOM and KNN classifiers is possible. Even though the data used referred to two rain events covering a total of only four days, representative pattern waveforms were identified and the SOM and KNN classifiers yielded satisfactory success rates, which outperformed the traditional power-law relationship. It is anticipated that more data, representing a wider diversity of possible meteorological conditions, will lead to better results.