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Comparison of a k-Nearest-Neighbor Simulator and LARS-WG for generating daily Precipitation

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Weather generators are stochastic models that produce synthetic long time series of weather data from limited records of historical data with statistically similar characteristics to those of observed. Long timeseries of synthetic weather daily data, especially precipitation, are required as climate inputs to hydrological and agricultural models, in order to evaluate the performance of the associated physical systems. LARS-WG is a semi parametric weather generator that uses flexible semi-empirical distributions for the lengths of wet and dry day series and daily precipitation. On the other hand, k-Nearest Neighbor is a non parametric technique to resample data from historical records by conditioning on the preceding days (feature vector). The model finds the historical number of nearest neighbors of the current weather vector using the Euclidean distance and resamples from it their successors. To preserve the temporal persistence, the model calculates the Euclidean distance of vectors which have similar sequence of wet and dry days. The objective of this study is to evaluate the performance of these two different models in reproducing interannual variability of precipitation in three stations in Germany.

Keywords: Weather generator, k-Nearest-Neighbor, LARSWG, daily precipitation