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Neural network modelling of CIMIS-ET0 (revisited)

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This paper will revisit the use of four independent hydrometeorological variables to predict 'reference crop evapotranspiration' in a neural network model - calculated as CIMIS-ET0 (Kisi, 2006; Aytek et al., 2008). The two earlier studies are coalesced and their published findings positioned in a broader environmental modelling context. Four models developed on similar datasets are compared and contrasted in the current exercise: a multiple linear regression model (MLIN: Pearson, 1896), a piecewise multiple linear regression model (M5 Model Tree; M5MT: Quinlan, 1992; Wang & Witten, 1997) and two neural network models developed on different optimisation algorithms - Conjugate Gradient (CGNN: Hestenes & Stiefel, 1952) and Levenberg-Marquet (LMNN: Levenberg, 1944; Marquardt, 1963). The results are presented using residual scatterplots so that the exact nature of the each individual modelling solution can be determined: permitting outputs to be interpreted in terms of structures, symmetries, orientations, local features and outliers. The reported inspection and interpretation of plots is matched against a selection of traditional numerical modelling statistics that were computed on HydroTest (http://www.hydrotest.org.uk; Dawson et al., 2007). The reported closeness of earlier neurocomputing outputs to predicted values estimated using a counterpart multiple linear regression model is explained in detail.