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The application of artificial neural networks and autoregressive techniques for Earth Orientation Parameters prediction.

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The Earth Orientation Parameters (EOP) time series e.g., pole coordinates, UT1-UTC, and nutation corrections, published by the IERS can be described by different models and statistical parameters obtained using the least-squares analysis (LS), Artificial Neural Networks (ANN), and autoregressive (AR) techniques. In the case of the ANN different architectures were used taking into account different number of layers and neurons, which were optimized empirically after performing several tests. In the autoregressive prediction the AR coefficients were obtained by the LS from the modified Yule-Walker equations and the choice of the autoregressive order was optimized empirically to improve the prediction. Best prediction results of the EOP were obtained when combining the LS extrapolation with the ANN or AR predictions of the LS extrapolation residuals. The mean prediction errors of the presented techniques were compared with the mean prediction errors of the EOP forecasts published by the IERS Rapid Service/Prediction Centre.