

Application of neural networks to the management of voltage constraints in the Spanish market

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Abstract-

The security criteria of a power system require that branch power flows and bus voltages are within their limits, not only in normal operating conditions but also when any credible contingency occurs. In the Spanish electricity market, voltage constraints are solved by connecting a set of off-line generators located in the areas where they occur. Thus, for a market participant it is necessary to predict approximately when its generating units are connected in order to prepare the annual budget and/or decide the time and location of new plants. The authors have presented in a former paper a methodology based on decision trees to estimate the daily load pattern of units, which have not been cleared in the daily energy market and can be connected to alleviate voltage constraints. In this paper, considering a set of potential explanatory variables, a different methodology based on neural networks is proposed to forecast if a non-connected unit will be committed by the system operator to remove voltage violations. The performance of neural networks is illustrated with a study case. In addition, a thorough comparison with the methodology based on decision trees is carried out.

Index Terms- neural networks, power system dispatch, security assessment, congestion management, decision trees, clustering, Bayesian probability.

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Citation:

Ugedo, A.; Lobato, E. "Application of neural networks to the management of voltage constraints in the Spanish market", International Journal of Electrical Power & Energy Systems, vol.33, no.7, pp.1262-1271, September, 2011.