

Priority chronological time-period clustering for generation and transmission expansion planning problems with long-term dynamics

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Abstract-

The increasing incorporation of renewable generating units into power systems has made it imperative to model variabilities during the resolution of generation and transmission expansion planning problems. This is commonly carried out by considering representative time periods, which are attained using clustering techniques, since the use of all historical data may involve computationally intractable problems. The chronological information concerning the input data should be maintained when representative time periods are used to model inter-temporal constraints. This is the case of long-term storage, which may be critical as regards mitigating the fluctuations related to renewable production. Recent clustering techniques have resolved this drawback at the cost of not ensuring the feasibility of the problem or underestimating extreme values of input data, which may influence investment decisions. This paper proposes a new clustering method that is based on previous techniques, maintains the chronological information regarding the input data throughout the entire time horizon and assigns more priority to the representation of extreme values. Numerical results show that the use of the proposed clustering method involves a reduction in the computational burden, since investment plans closer to the optimal solution are attained while considering less representative time periods than occurs with other methods.

Index Terms- Clustering techniques, extreme values, generation and transmission expansion planning, long-term dynamics.

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