A web based software system for database generation for online dynamic security assessment studies (ML4DSA)

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The training and test data generation is a main task involved in the application of supervised learning techniques for power systems dynamic security assessment. Due to its vast geographic area and large number of planned and unplanned events, it is unlikely to successfully train a single learned network that is applicable at all times. Training of several learned networks initially or at regular intervals during the operation would be required. The aim of the developed system is to produce a learned network appropriate for forecasting for a given period of time using a snapshot of the current state of the power system. This raises the need to have the automation algorithms for database generation for machine learning. Development of these algorithms occupies a considerable portion of time spent on the entire study. Therefore, having a ready-made and a customizable tool is an advantage. The developed software is a general system that can be used for an existing power system model. Moreover, the uniqueness of the software is to facilitate the customization of the power system specific constraints and corrective actions.

Customization is essential for data generation for successful application of machine learning [1]. ML4DSA enables the user to incorporate the expertise of the operating engineers in terms of rules and parameters. Further, the software system automates the Power System Simulator for Engineering (PSSE) which is an industry standard power systems analysis tool. Availability of the PSSE system models enables the easy adaption of the developed software. ML4DSA is based on the Python programming language available in the public domain for free [2]. Thus, there will be no additional cost as most utilities are already using PSSE for modeling their own systems. The web based software enables access over the web for the authorized users requiring no additional software installed on client computers. Built in database integration provides convenient access to resources at the same place and easy recording of stability assessment results.

ML4DSA is tested on the IEEE 39 bus test system and the Midwest Reliability Organization (MRO) system which has over 50,000 buses [3]. At present, the software system is under development. Successful test results indicate that ML4DSA is capable of handling large power system models.

References

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