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Research and Practice of Machine Learning Technology in Grid Dispatching Automation

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Abstract

In recent years, with the development of artificial intelligence technology, especially AlphaGo developed by Google, which is represented by DL (Deep Learning) technology, has caused a huge stir around the world by defeating human professional go master. At present, deep learning technology has been applied in many fields such as driverless car, machine translation, image recognition, medical aided diagnosis and financial investment, which attracts the attention of all trades and professions. How to apply the above technologies in the field of power system is a hot and difficult issue for the domestic and foreign experts and scholars at present.

As an important technical support method for real-time operation control of power grids, the dispatch automation system has accumulated a great deal of power grid operation history data, which provides data support for the research and practice of machine learning technology. This paper combines the characteristics of real-time dispatching and operation of the power grid, introduces the idea of user portraits on the Internet, proposes the connotation and concept of power grid portraits, uses artificial intelligence technology, and collects data from multi-dimensional data, power grid snapshot management, machine learning engine and portrait depiction. Build the overall structure of the power grid image, the main content is as follows:

Firstly, at the level of multi-dimensional data aggregation, a set of management technologies for real-time data, management data, and structured/semi-structured data are presented. Distributed message queues, ETL extraction, and service buses are used to implement real-time measurement of power grids and external networks. The collection of meteorological environment, geographical coordinates, equipment video and defects, etc. Second, in terms of snapshot management, a dynamic and static separation of grid operation data storage technology is proposed to form a holographic snapshot of the grid operation, which provided a basis for subsequent data analysis; At the machine learning engine level, a learning engine based on integrated learning, bayesian networks, cluster analysis, and reinforcement learning was constructed based on TensorFlow. Finally, at the portrait depiction level, artificial intelligence-based load forecasting, equipment failure prediction, new energy generation prediction, operational index trend analysis and other aspects, carry out research and practice, portray the grid operation situation, analyze the weak points, and shift from the traditional model-driven to data-driven for the scheduling operation, and then evolve to provide technical support for knowledge guidance.