Investment Planning Problem in Power System Using Artificial Neural Network

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ABSTRACT

This paper presents a model to solve Distribution Expansion Planning (DEP) problem. An effective method is proposed to determine an optimal solution for strategic investment planning in distribution system. The proposed method will be formulated by using mean-variance analysis (MVA) approach in the form of mixed-integer quadratic programming problem. Its target is to minimize the risk and maximize the expected return. The proposed method consists of two layers neural networks combining Hopfield network at the upper layer and Boltzmann machine in the lower layer resulting the fast computational time. The originality of the proposed model is it will delete the unit of the lower layer, which is not selected in upper layer in its execution. Then, the lower layer is restructured using the selected units. Due to this feature, the proposed model will improve times and the accuracy of obtained solution. The significance of output from this project is the improvement of computational time and the accurate solution will be obtained. This model might help the decision makers to choose the optimal solution with variety options provided from this proposed method. Therefore, the performance of strategic investment planning in solving DEP problem certainly enhanced

Keywords: Mean-variance analysis, Hopfield network, Boltzmann machine, Distribution expansion planning.

1. INTRODUCTION

Due to the economic growth in the world’s population, the demand for electricity has grown. To obtain a reliable and sustainable electricity supply, a well-organized power operation system becomes more vital. Since the demand of electricity keep increasing, thus a meticulous planning should be provided in to enhance the delivering process of electricity to consumer. Distribution Expansion Planning (DEP) has been a very hot topic in the 21st Century [1]. DEP is the service of increasing or rebuild the distribution system so that it fulfills the predicted load requirement that satisfy all operational and technical constraint and at the same time it lower the operational, investment, annualized and planning cost [2].

In real situations, DEP used to face complicated investment planning problems and most of them are non-linear programming problem which is hard to solve. To minimize the misdirect investment a method based on the mean-variance approach is proposed by referring the past data.

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