Resource Leveling Optimization in Construction Projects of High Voltage Substations Using Nature-Inspired Intelligent Evolutionary Algorithms

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Abstract : High Voltage Substations (HVS) are the intermediate step between production of power and successfully transmitting it to clients, making them one of the most important checkpoints in power grids. Nowadays - renewable resources and consequently distributed generation are growing fast, the construction of HVS is of high importance both in terms of quality and time completion so that new energy producers can quickly and safely intergrade in power grids. The resources needed, such as machines and workers, should be carefully allocated so that the construction of a HVS is completed on time, with the lowest possible cost (e.g. not spending additional cost that were not taken into consideration, because of project delays), but in the highest quality. In addition, there are milestones and several checkpoints to be precisely achieved during construction to ensure the cost and timeline control and to ensure that the percentage of governmental funding will be granted. The management of such a demanding project is a NP-hard problem that consists of prerequisite constraints and resource limits for each task of the project. In this work, a hybrid meta-heuristic method is implemented to solve this problem. Meta-heuristics have been proven to be quite useful when dealing with high-dimensional constraint optimization problems. Hybridization of them results in boost of their performance.