DISTRIBUTION SYSTEM FEEDER RECONFIGURATION ALGORITHMS SURVEY

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ABSTRACT

Power generated in power stations pass through large and complex networks like transformers, overhead lines, cables and other equipment and reaches at the end users. All circuit conductors between the service equipment, the source of a separately derived system, or other power supply source and the final branch-circuit over current device is known as feeder. It is fact that the unit of electric energy generated by Power Station does not match with the units distributed to the consumers. Some percentage of the units is lost in the distribution network. The major amount of losses in a power system is in primary and secondary distribution lines. They are two types of distribution losses.

1.INTRODUCTION

Technical losses occur when the energy is dissipated by the equipment and conductors in the distribution lines. The losses depend on the network characteristics, and mode of operation. There are two categories of technical power losses; the fixed technical losses and the variable technical lossesTechnical Losses. Non Technical Losses (Commercial Losses)Technical losses occur naturally and consist mainly of power dissipation in electricity system components such as transmission and distribution lines, transformers, and measurement systems. Metering and billing for electricity actually consumed by users is integral to commercial management of an electricity utility..Non-technical losses are caused by actions external to the power system and consist primarily of electricity theft, non-payment by customers, and errors in accounting and record-keeping. Metering and billing for electricity actually consumed by users is integral to commercial management of an electricity utility.

2.LOSS MINIMIZATION

There are a number of ways to reduce transmission and distribution losses. Some of the options to reduce technical losses include: One of the main benefits of applying capacitor is that they can reduce distribution line losses, replacing incorrectly sized transformers, improving the connection quality of conductors (power lines), and increasing the availability of reactive power by installing capacitor banks along transmission lines. To reduce non-technical causes, policymakers can target theft by making it harder to steal power from lines

A.Fixed technical losses

The fixed losses in the distribution lines account for between a quarter and a third of the total technical losses. These are usually in the form of heat and noise and occur whenever the transformer is energized. The fixed losses are not influenced by the amount of load current flowing, but rather by

- The leakage current losses
- Open circuit losses
- Corona losses

- Dielectric losses

B. Variable technical losses

The variable losses are proportional to the square of the load current and accounts to between 2/3 and ¾ of the technical losses in a distribution system.The variable losses arise due to the line impedance, contact resistance and the joule heating losses.

C. Causes of technical losses

Inefficient equipment such as the transformers, pumps, electrical machines and industrial loads ,Inadequate size of conductor in the distribution lines **,**Long distribution lines **,**Load imbalance among the phases **,** Low power factor.

D. Commercial(non-technical)power losses

The non-technical losses, also referred to as commercial losses, are those related to unmetered supplies, incorrect billing, untimely billing, wrong tariff, defective meters and energy thefts. The unmetered supplies are those that may be left out when estimated amounts are used to calculate the amount of power to bill for. In addition, some consumers may tamper with the meters to make them indicate less power than what is actually used. The energy theft may occur when consumers tamper with the metering, or collude with the utility personnel to make illegal connections.

3.MODIFIED PLANT GROWTH ALGORITHM

The objective of this algorithm is to get maximum power loss reduction in distribution system. It is calculated by adding the losses of all line sections of the feeder. Radial distribution is the best configuration, because it gives a minimum power loss without violating the operation constraints. The algorithm based on plant growth process. The main advantage of MPGSA is that constraints and objective function are There are many benefits of distributed generation like loss reduction, greener environment.

4.GENETIC ALGORITHM

A genetic algorithm (GA) is a population-based heuristic search algorithm where the search is guided according to a fitness function formulated by the addition of an objective function and penalty functions. The optimization search starts with creating a random initial population pool. The search iteratively repeats by generating new populations using crossover and mutation operations.It is search technique used in computing to find approximate solutions to optimization and search problems. It is more efficient and satisfies the conditions of the global optimal .Particular class of evolutionary algorithms that use techniques inspired by evolutionary biology such as inheritance ,mutation, selection and cross over. Solutions are represent in binary as stings of 0's and 1's.other encoding also possible.

In each generation, the fitness of every strings in the population is evaluated and the multiple are selected from the current population and modified to form a new population. The new population is then used in the next iteration of the algorithm commonly, the algorithm terminates when either maximum no of generation. Solutions may or may not been reached.Cross over and mutation take place and best solution obtained. An advanced method to study the electrical distribution network through feeder reconfiguration using Improved Genetic Algorithm The Distribution Network Feeder Reconfiguration is modified efficiently using some improvements in crossover and mutation.

The main advantages are its ability to find good quality solutions in a short time of computation. It cannot guarantee an optimal solution. .The crossover rate should be 80%-95%. The method of selection should be appropriate. Writing of fitness function must be accurate .Mutation rate should be slow(0.5%-1%)

5. CUKOO ALGORITHM

Cuckoo search is an optimization algorithm inspired by the brood parasitism of cuckoo species, which lay their eggs in the nests of other host birds. CS achieved better quality solutions compare to existing algorithms. If a host bird discovers foreign eggs in its nest, it will either abandon the nest and build a new nest elsewhere or simply throw the foreign eggs away. The aim is to replace a worst solution in the nests with the new and possibly better solutions. A Cuckoo Search algorithm for DG placement and sizing problem in the radial distribution system to reduce total real power losses and improve voltage stability with imposed voltage constraint. The CS provides both optimal location and sizing of DG as the outputs. The other advantages such as the economic and environmental aspects of DG are not considered.

6. HUERISTIC ALGORITHM

Branch-and-bound technique and dynamic programming are quite effective but their time-complexity often is too high and unacceptable for NP-complete tasks.Hill-climbing algorithm is effective, but it has a significant drawback called pre-mature convergence. Since it is ”greedy”, it always finds the nearest local optimal of low quality.Usually heuristic algorithms are used for problems that cannot be easily solved. Heuristic algorithm can give good quality. Because it gives the near-optimal results. Advantages of heuristic algorithms are (often) conceptually simpler and (almost always) much cheaper computationally than optimal algorithms.

7.HYBRID ALGORITHM

Hybrid GAs and Fuzzy Neural System focuses on hybrid with two jobs. First, the use of Genetic Algorithms on neural network is used to avoid local optimum on neural network. Implement of GA is present in the input and output weights NN. Secondly, FIS in Fuzzy Neural System uses two stages where its goal to reduce the rule to be faster in the computing side. Separation rule into two phases based on the relationship of positive and negative with the use of electricity

The problem determination of optimized Neural Network weight can be solved by using genetic algorithm and reduce rule on fuzzy inference system where the division parameter two stage FIS is based on the effect on electricity consumption. It makes more agile and accurate in forecasting using many input parameters on Fuzzy Inference System

8. PARTICLES SWARM OPTIMIZATION

This method was used to find global best position through the all search space with help of constantly varying velocity and direction of birds flocking.PSO is the computational technique which can be used to solve difficult non linear problems in power system such as FACTS devices sizing and optimal location, loss reduction ,cost reduction, transient stability improvement. The techniques used in higher bus system, **PSO** is based on the intelligence. It can be applied into both scientific research and engineering use. It can be used to solve a wide array of different optimization problems. Like evolutionary algorithms, PSO technique conducts search using a population of particles corresponding to individuals. Each particle represents a candidate solution to the problem at hand

CONCLUSIONS

The above literature survey is used to find the different algorithm for feeder reconfiguration in distribution system. The feeder reconfiguration are using for losses reduction in distribution side. Each algorithm have some advantages and disadvantages based on application select the algorithm for problem solving. This feeder reconfiguration is one of method for losses minimization in Distribution side, in future find other methods and algorithms for losses minimization in the Distribution side.

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