Generation expansion planning using evolutionary computing technique

Generation Expansion Planning (GEP) problem is an important problem for the decision planners in the power utilities. The growth of population and increasing consumption of electricity expose countries to build additional power units. Because of technical and economical differences of the energy sources, generation expansion planning is used to determine the best unit type for the additional capacity. Costs have always been a very important factor in decision making, in particular for choices between alternative energy sources and electricity generation technologies. Eventually, costs, risks and benefits of an energy source need to be analyzed in comparison with those of other energy sources and options. GEP in fact defines when, where and which new generating unit should be commissioned online in the long term of planning horizon. The main goal of GEP is to minimize the total investment, operating and maintenance and interruption costs associated with the addition of new power generating units in the planning horizon subject to constraints such as, forecast demand, transmission, acceptable level of reliability, fuel mix and environmental criterion.

In evolutionary computation, an initial set of candidate solutions is generated and iteratively updated. Each new generation is produced by stochastically removing less desired solutions, and introducing small random change. Evolutionary computation techniques can produce highly optimized solutions in a wide range of problem settings.

In this research renewable energies are considered as the expansion candidates in addition to the conventional plants by using evolutionary computing techniques.