

Long Term Energy Demand Forecasting based on Hybrid, Optimization: Comparative Study

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Abstract. The objective of this research is to develop a long term energy demand forecasting model that used hybrid optimization. To accomplish this goal, a hybrid algorithm that combined a genetic algorithm and a local search algorithm method has been developed to overcome premature convergence. Model performances of hybrid algorithm were compared with former single algorithm model in estimating parameter values of an objective function to measure the goodness-of-fit between the observed data and simulated results. Averages error between two models was adopt to select the proper model for future projection of energy demand.

Keywords: *energy demand forecasting, hybrid algorithm, optimization*

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1. Introduction

Long-term energy demand forecasting used many approach to estimate model parameters. These approach including classic and modern approach [1]. Genetic Algorithm (GA) as an artificial intelligence (AI) modern approach received much attention as robust stochastic search algorithms for various problems. This class of methods is based on the mechanism of natural selection and natural genetics, which combines the notion of survival of the fittest, random and yet structured, search and parallel evaluation of the points in various areas. GA is one of approximate (heuristic) algorithms that used to tackle the hard optimization problems that have great importance in research and development [2].

The approach using GA for long-term demand forecasting is done by [3]; [4] and [5]. GA is used as optimization tools for complex problems that involve numerous variables or involve combinations of linear and non-linear equations. As an optimization tool, the GA attempts to improve performance leading to an optimal solution.

There are many examples of long-term energy demand forecasting models based on GA. Genetic Algorithm Electricity Demand (GAED), exponential for total electricity demand and quadratic for forecasting industrial sector electricity demand are three examples models in forecasting the electricity demand for Turkey [3]. These models used original genetic algorithm as optimization tool. However, the performances of these models are far from being ideal and need some improvement in term of estimation errors.

Several long-term demand forecasting models using the modern approaches to decrease the problems in estimation error (EE), local optimality (LO), large iteration (LI) and computational time (CT). More efforts are need to be taken in order to develop long-term demand forecasting model and